CHAPTER 9—STORM DRAINAGE DESIGN AND STORMWATER QUALITY REGULATIONS

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Chapter 9—STORM DRAINAGE DESIGN AND STORMWATER QUALITY REGULATIONS

This chapter presents the storm drainage and erosion control design and technical criteria for the analysis and preparation of project plans for storm drainage facilities. Applications for various types of land use applications such as subdivision plats, conditional use permits that include development, phased multi-year build outs, and commercial/industrial building permits submitted for county approval will require some form of storm drainage system analysis and appropriate drainage system design. The following information should be viewed as minimum requirements. Changes to these standards must receive prior written approval from the County.

9-01 STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA

9-01-01 GENERAL

The County has adopted the following design standards, criteria, and policies for all storm drainage management and should be used in the design and analysis of all storm drainage facilities. The County reserves the right to issue and enforce more stringent criteria should adverse conditions exist. Also, occasions may arise where the minimum standards presented within this chapter are either inappropriate or cannot be justified economically. In these special cases, the County may issue administrative relief. All designs that vary from the standards and criteria presented in this chapter, shall obtain approval from the Director of the Transportation Department prior to completing construction plans and/or analysis reports.

The provisions for adequate drainage are necessary to preserve and promote the general health, welfare, and economic well being of the region. Drainage is a regional feature that affects all governmental jurisdictions and all parcels of property. When planning drainage facilities, the following policies and criteria are to be used in directing your effort.

Standards and technical criteria not specifically addressed in this Section shall follow the provisions of the Urban Drainage and Flood Control District (UDFCD) "Urban Storm Drainage Criteria Manual" (Manual, or referred to as Volume 1, 2, or 3). In addition, the engineer should refer to the Colorado Department of Transportation Standard Plans for additional design details not covered in this Section.

9-01-02 REQUIRED DESIGN SUBMITTALS

Drainage Plans submitted to the County for review shall contain a detailed hydrologic analysis and comprehensive drainage design in accordance with these criteria and other applicable standards (local, state, and federal). Prior to receiving approval, the final Drainage Plans must be sealed and signed by a Colorado Registered Professional

Engineer who has extensive knowledge of the project being submitted for review. Drawings submitted without being signed and sealed by a party not responsible for the work WILL NOT be reviewed.

All preliminary and final drainage plans and reports shall include certification statements regarding engineered plans and construction. Copies of these certification statements are included in the appendices of these regulations.

Table 9.1 presents the minimum level of storm drainage study to be prepared and submitted to the County for approval. Based on the application and size of the project being submitted, the level of analysis and design detail required varies and can be determined by the checklist (see appendix) in the application package and/or by contacting the County. All required information is to be submitted for county review prior to receiving an approved application or permit. Applicants are encouraged to prepare the required submittals with as much detail as possible to minimize possible confusion and cut down on overall processing time. Should there be questions regarding the required submittals, please contact the Transportation Department.

Table 9.1—Level of Storm Drainage Study

Type of Application	Expected Increase in Impervious Area	Level of Storm Drainage Study (SDS) & Plan
Commercial/Industrial Building Permits, Apartment/Condominium/Town home Complexes	3,000-10,000 square feet	Level 2 – SDS
	>10,000 square feet	Level 3 – SDS
Residential Plats and/or Planned Unit Developments	500-3,000 square feet	Level 1 – SDS
	3,000-10,000 square feet	Level 2 – SDS
	>10,000 square feet	Level 3 – SDS
All Other Plats and/or Planned Unit Developments	3,000-10,000 square feet	Level 2 – SDS
	>10,000 square feet	Level 3 – SDS
Multi-year build out developments	N/A	Develop a Master SDS for the full build out and updated prior to each filing.
Change-in-materials Application	500-3,000 square feet	Level 1 – SDS
	3,000-10,000 square feet	Level 2 – SDS
	>10,000 square feet	Level 3 – SDS

The Director of the Transportation Department may impose an SDS (also referred to as a grading and drainage plan) for any type of application if it is determined the new drainage will have significant impacts on adjacent properties.

The Director of the Transportation Department may grant administrative relief from the criteria, if in the Director's judgment the nature of the work applied for meets the intent of these standards and specifications. Such relief shall be based upon technical justification, sealed by a Colorado registered professional engineer, submitted with the SDS.

9-01-03 POLICIES

9-01-03-01 SPACE PLANNING

Stormwater management facilities serve conveyance, quality and storage functions for stormwater. When a channel is planned as a conveyance feature, an outlet as well as downstream storage structure is required. Therefore, during the review process and prior to approval, the County will require the submission of all appropriate information to insure:

- Adequate space is properly allocated for drainage facilities,

- There are no conflicts with other land uses that result in downstream water damage or impairment of runoff from upstream properties,
- There is no impairment with the functionality of other urban systems.

9-01-03-02 MULTI-USE RESOURCE

Stormwater runoff is an urban resource and potentially has many beneficial uses. However, runoff is a limited resource, quality aspects of the water become important and should be planned for in the design of storm drainage management facilities. Therefore, during the review process and prior to approval, the County will encourage stormwater runoff to be considered as a multi-use resource and require a reflection of this philosophy in all submitted design.

9-01-03-03 WATER RIGHTS

The Developer is responsible to ensure that water rights are not impacted as a result of a proposed project.

9-01-03-04 IRRIGATION DITCH CROSSINGS

Various privately owned irrigation ditches and canals traverse the County. It is the policy of the County that irrigation ditches are not acceptable as drainage recipients or as part of a drainage plan. However, they may be considered under special circumstances when all other options do not provide a solution. Any development which proposes the use of these facilities for surface drainage or makes any modifications to the existing topography which alters and/or affects drainage patterns to the ditch, must receive written approval from the appropriate ditch owner prior to submitting said project application to the County.

9-01-03-05 JURISDICTIONAL BOUNDARIES

Since drainage considerations and problems are regional in nature, and do not respect jurisdictional boundaries, the County will emphasize regional cooperation in all submitted designs.

9-01-03-06 BASIN TRANSFER

Colorado drainage law recognizes the difficulties of transferring the burden of managing storm drainage from one location or property to another. Liability questions may also arise when the historic drainage is altered. Therefore, during the review process and prior to approval, the County will discourage the diversion of storm runoff from one basin to another unless specific and/or prudent reasons justify such a transfer. In such cases the proponent will need to demonstrate and

provide facilities to insure no increase in flood damage potential from any level of runoff event.

9-01-03-07 MASTER PLANNING

As previously stated, drainage boundaries are non-jurisdictional and regional cooperation is required to receive approval for all new development or re-development projects. Therefore, the County has and will continue to participate in future regional master plans to define the major drainageway facilities. However, an outcome of this participation is that potential fees may be imposed to cover the cost of master plan preparation in unplanned basins being proposed for new development and/or redevelopment. Whenever a master plan exists in which the County took part to develop, its recommendations shall be followed to the maximum extent possible.

9-01-03-08 PUBLIC IMPROVEMENTS

During the review process and prior to approval, the County may require new development and/or redevelopment projects participate in public improvements proposed in developed drainage reports and construction plans, and master plans for both local drainage systems (i.e., curb and gutter, inlets and storm sewers, culverts, bridges, swales, ditches, channels, detention areas, and other drainage facilities within the development) and major drainageway systems (i.e., channels, storm sewers, bridges, detention areas, and other facilities serving more than the subdivision or property in question).

9-01-03-09 FLOODPLAIN MANAGEMENT

As part of its zoning resolutions, the County has adopted floodplain regulations necessary to preserve and promote the general health, welfare, and economic well being of the region. The general purposes of floodplain regulations are summarized as follows:

1. To reduce the hazard of floods to life and property;
2. To protect and preserve hydraulic characteristics of watercourses used for conveyance of floodwaters;
3. To protect the public from the extraordinary financial expenditures for flood control and relief; and
4. To promote the multipurpose resource concept, previously outlined, with the intent to provide and preserve quality open space, trails, and tree lines.

These regulations are presented in Chapter 3 of this document. It is the responsibility of the designer to comply with the most current zoning and floodplain regulations.

9-01-03-10 RETENTION

In those areas of the county where no outlet presently exists for positive drainage to a major drainage system, the County will require retention of the runoff from a 24-hour, 100-year storm event plus one foot of freeboard until such connection becomes available. Should the retention pond be confined behind an embankment, suitable protection from damage due to overtopping shall be provided. In addition, no parking lot retention shall be permitted.

The Developer shall be responsible for mitigating all impacts to water rights as a result of flood control retention.

9-01-03-11 STORM RUNOFF DETENTION

The County considers storm runoff detention to be a viable method for reducing overall (construction and maintenance) urban drainage degradation. Temporarily detaining a few acre-feet of runoff can significantly reduce downstream flood hazards as well as pipe and channel requirements in urban areas. In addition, the storage of runoff provides for sediment and debris collection, which enhances downstream water quality. However, all benefits can only be obtained through consistent administration of detention and water quality policies. Therefore, during the review process and prior to approval, the County will require all new development and/or redevelopment projects include some form of onsite detention and water quality treatment. The minimum capacity and maximum release rates for the 5-year and 100-year recurrence interval storms will be determined by procedures and criteria presented in this chapter.

The County discourages the use of parking lots as detention structures.

The treatment of stormwater quality from surface runoff is required in regulations by federal and state agencies. Developers shall calculate the Water Quality Capture Volume as set forth in Volume 3, Chapter 3, Section 3, “Calculation of the Water Quality Capture Volume” of the Urban Drainage Manual, as revised.

9-01-03-12 POST-CONSTRUCTION STORMWATER BMPS

In accordance with Adams County’s Municipal Separate Storm Sewer (MS4) Permit under the Post-Construction Runoff Minimum Control Measure Adams County is mandated to require that development/redevelopment that disturbs one acre or greater shall implement an allowed form of permanent stormwater quality BMP to treat and improve the quality of stormwater that leaves a site. Refer to Section 9-07-02 for allowable post-construction BMPs.

9-01-04 STORM SEWER OPERATIONS AND MAINTENANCE

Key issues in the long-term performance of all storm drainage systems are the proper operations and continued maintenance of the facility (i.e. debris and sediment removal). In order to ensure proper system operations and maintenance of private infrastructure, the County may perform periodic inspections of all critical storage facilities and conveyance structures.

Refer to section 9-07-03 Operations and Maintenance of Permanent BMPs for maintenance requirements of post-construction BMPs.

9-01-05 STORM DESIGN CRITERIA

In addition to land use, all drainage systems being designed within the county shall take into account both the minor (5 to 10-year) and the major (100-year) storm. The objectives of drainage system planning for the minor storm are to allow for the proper design of minor drainage systems (i.e. curb and gutters, storm sewers, open channels and detention ponds) while minimizing minor damage and maintenance costs. The objectives of drainage planning for the major storm are to allow for proper design of major drainage systems (i.e. bridges, storm sewers, open channels and detention ponds) while minimizing the possibility of major damage and/or loss of life. (Refer to Table 9.2 - Return Periods.)

It is the responsibility of the design engineer to develop, justify, and submit values used in the preparation of drainage plans prepared for county review and approval.

9-01-05-01 STORM DRAINAGE PLANNING

When determining design storm flows, the engineer shall follow appropriate criteria and guidelines to assure that minimum design standards and a regional based drainage solution are developed. The information presented below shall be used by the engineer in the development of design storm runoff for both onsite and offsite flows.

9-01-05-01-01 *ONSITE FLOW ANALYSIS*

When performing analysis on the onsite basin to determine peak volumes and time of concentrations, the engineer shall use the proposed fully developed land use plan to determine runoff coefficients and consider changes in flow patterns (from the undeveloped site conditions) caused by the proposed plan (including street alignments). When evaluating the estimated time of concentrations, the proposed lot grading shall be used to calculate the time of concentration. The proposed project shall in no way change historic runoff values, cause downstream damage, or adversely impact adjacent properties. In addition, phased or partial development analysis will not be accepted. The

entire platted parcel shall be analyzed for full build-out in order to properly site and size detention/retention areas and conveyance systems.

Different levels of onsite analysis may be required depending on the size of project or as directed by the Director of the Transportation Department. See appropriate Application Package for analysis requirements.

9-01-05-01-02 *OFFSITE FLOW ANALYSIS*

The analysis of offsite runoff is dependent on regional drainage characteristics (whether or not the tributary offsite area lies within a major drainage basin) and the existing/proposed land use and topographic features. If an existing Storm Drainage Master Plan is available for the region being developed, the engineer shall use this as a baseline document (prior approval from the County on the Master Plan is required) and update it with proposed information. However, should no offsite information be available for fully developed flows (5-, 10- and 100-year), the engineer must perform a regional analysis to insure the proposed development does not change historic runoff values, cause downstream damage, or adversely impact adjacent properties.

Different levels of offsite analysis may be required depending on the size of project or as directed by the Director of the Transportation Department. See appropriate Application Package for analysis requirements.

9-01-05-02 STORM RETURN PERIOD

The minor and major storm return period shall not be less than those found in Table 9.2 for all vital drainage structures or critical points of surface water flow.

Table 9.2—Return Periods

Land Use	Return Period (Yrs) for Minor Drainage Systems	Return Period (Yrs) for Major Drainage Systems
Residential-Urban	5	100
Residential-Rural	10[a]	100
Commercial	5	100
Industrial	5	100
Open Space	5	100
School	5	100

[a] All roadside ditches and culverts shall be sized to carry the 10-year peak runoff.

9-01-05-03 RAINFALL

Presented in this section are guidelines for the development of rainfall data to be used in preparing a hydrological analysis (storm runoff) for a proposed development within the County.

The rainfall intensity information published by the National Oceanic and Atmospheric Administration (NOAA) in the "Precipitation-Frequency Atlas of the Western United States" was used to develop incremental rainfall distributions presented in Table 9.5. The incremental rainfall distributions presented in this table are based on procedures developed by the UDFCD. However, refinements have been made to closely match conditions within the county.

9-01-05-04 TIME-INTENSITY-FREQUENCY CURVES

A time-intensity-frequency curve was developed for the county by using one-hour point rainfall values (see Table 9.3) and factors for durations of less than one hour (see Table 9.4); both obtained from the NOAA Atlas. The outcome of this distribution are point values that were then converted to intensities and plotted as Figure 9.1. Rainfall data from the Urban Drainage and Flood Control District (UDFCD) may be used as an alternative (see UDFCD Criteria Manual).

Table 9.3—One-Hour Point Rainfall (inches)

2-Year	5-Year	10-Year	50-Year	100-Year
1.00	1.42	1.68	2.35	2.71

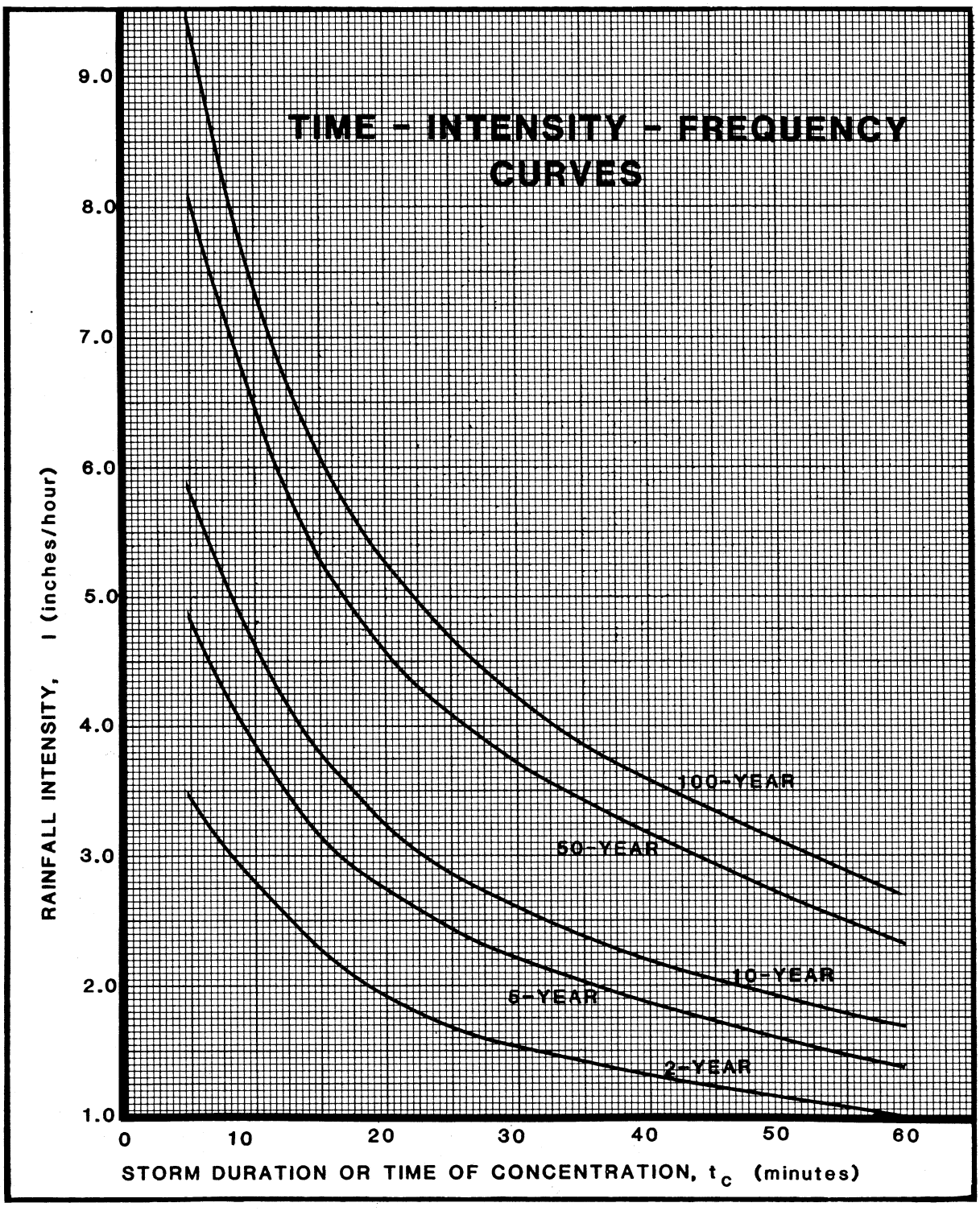
Table 9.4—Factors for Durations of Less than One Hour

Duration (minutes)	5	10	15	30
Ratio to 1-hour depth	0.29	0.45	0.57	0.79

Table 9.5—Incremental Rainfall Depths

Time (min)	Incremental Rainfall Depth (Inches)														
	Basins <5 SQ. Miles					Basins between 5 and 10 SQ. Miles					Basins between 10 and 20 SQ. Miles				
	Return Period (Yr.)					Return Period (Yr.)					Return Period (Yr.)				
	2	5	10	50	100	2	5	10	50	100	2	5	10	50	100
5	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03
10	0.04	0.05	0.06	0.08	0.08	0.04	0.05	0.06	0.08	0.08	0.04	0.05	0.06	0.08	0.08
15	0.08	0.12	0.14	0.12	0.12	0.08	0.12	0.14	0.12	0.12	0.08	0.12	0.14	0.12	0.12
20	0.16	0.22	0.25	0.19	0.22	0.15	0.21	0.25	0.19	0.22	0.14	0.20	0.25	0.19	0.22
25	0.25	0.36	0.42	0.35	0.38	0.24	0.35	0.40	0.34	0.36	0.23	0.32	0.38	0.32	0.34
30	0.14	0.18	0.20	0.59	0.68	0.13	0.17	0.19	0.57	0.65	0.13	0.16	0.18	0.53	0.61
35	0.06	0.08	0.09	0.28	0.38	0.06	0.08	0.09	0.27	0.36	0.06	0.08	0.09	0.25	0.34
40	0.05	0.06	0.07	0.19	0.22	0.05	0.06	0.07	0.19	0.22	0.05	0.06	0.07	0.19	0.22
45	0.03	0.05	0.06	0.12	0.17	0.03	0.05	0.06	0.12	0.17	0.03	0.05	0.06	0.12	0.17
50	0.03	0.05	0.05	0.12	0.14	0.03	0.05	0.05	0.12	0.14	0.03	0.05	0.05	0.12	0.14
55	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11
60	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11
65	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11
70	0.02	0.04	0.05	0.06	0.05	0.02	0.04	0.05	0.06	0.05	0.02	0.04	0.05	0.06	0.05
75	0.02	0.03	0.05	0.06	0.05	0.02	0.03	0.05	0.06	0.05	0.02	0.03	0.05	0.06	0.05
80	0.02	0.03	0.04	0.04	0.03	0.02	0.03	0.04	0.04	0.03	0.02	0.03	0.04	0.04	0.03
85	0.02	0.03	0.03	0.04	0.03	0.02	0.03	0.03	0.04	0.03	0.02	0.03	0.03	0.04	0.03
90	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03
95	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03
100	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03
105	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03
110	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03
115	0.01	0.02	0.03	0.03	0.03	0.01	0.02	0.03	0.03	0.03	0.01	0.02	0.03	0.03	0.03
120	0.01	0.02	0.02	0.03	0.03	0.01	0.02	0.02	0.03	0.03	0.01	0.02	0.02	0.03	0.03
125											0.01	0.02	0.02	0.02	0.02
130											0.01	0.01	0.02	0.02	0.02
135											0.01	0.02	0.01	0.02	0.02
140											0.01	0.02	0.01	0.02	0.02
145											0.01	0.01	0.01	0.02	0.02
150											0.01	0.01	0.01	0.01	0.02
155											0.01	0.01	0.01	0.01	0.01
160											0.01	0.01	0.01	0.01	0.01
165											0.01	0.01	0.01	0.01	0.01
170											0.01	0.01	0.01	0.01	0.01
175											0.01	0.01	0.01	0.01	0.01
180											0.01	0.01	0.01	0.00	0.00
	1.15	1.61	1.89	2.72	3.12	1.12	1.58	1.86	2.68	3.05	1.22	1.68	1.97	2.76	3.14

Figure 9.1—Time-Intensity-Frequency Curves



9-01-05-05 RUNOFF COEFFICIENTS

The runoff coefficients to be used within the Rational Method, Colorado Urban Hydrograph Procedure (CUHP) or approved hydrologic models are to be determined based on existing and/or proposed land use and surface characteristics. When using the Rational Method and/or CUHP, the County requires the use of runoff coefficients presented in the Urban Drainage Manual, Volume 1.

9-01-05-06 TIME OF CONCENTRATION

In order to determine the rate of runoff at a designated outfall, the time of concentration must be determined. The time of concentration is the time it takes for water to flow from the most remote part of the drainage basin to the outfall of the study area. For the Rational Method, a separate time of concentration is necessary for the overall basin and each sub-basin. The time of concentration (T_c) is composed of the sheet or overland flow time (t_{ov}) and channel flow time (t_t). The time of concentration formula shall be as described in the Urban Drainage Manual, Volume 1 for this Section.

9-01-05-07 STORM FLOW ANALYSIS

The engineer shall use the Rational Method for basins less than 90 acres. CUHP or other approved hydrologic models shall be used for basins larger than 160 acres. Basins between 90 acres and 160 acres in area may use either method.

9-01-05-07-01 *RATIONAL METHOD EQUATION*

Equation 9.4

$$Q=CIA$$

Where

Q = Flow Rate, cfs
A = Total Area of Basin, acres
C = Runoff Coefficient (refer to Section 9-01-05-05)
I = Rainfall Intensity, inches per hour (refer to Section 9-01-05-04)

9-01-05-07-02 *COMPUTER AIDED HYDROLOGIC MODELS*

For analyzing larger basins (greater than 90 acres), the engineer may either use the CUHP (information detailed in Urban Drainage and Flood Control Manual) or another appropriate hydrology/hydraulics model. When using

other hydrology/hydraulics models, the engineer will be required to develop unit, flood, routing and combination hydrographs for use in determining peak flows and time of concentrations at vital drainage structures or critical points of surface water runoff. A unit hydrograph is defined as the direct runoff hydrograph that results from 1-inch of rainfall excess uniformly distributed throughout the basin over a specified duration. From this unit hydrograph, direct runoff hydrographs must be developed for a design storm by creating flood hydrographs. In addition, where surfaces (pervious and impervious) within the basin vary in characteristics, weighted or composite coefficients for each basin must be used in development of the unit and flood hydrographs. This is typically accomplished by breaking each basin into the appropriate number of sub-basins and using the corresponding surface coefficients. Each computer-aided model has default parameters for typical surface characteristics and soil types; the selection of these parameters is the key to a successful analysis and therefore must be submitted with the Storm Drainage Study.

9-01-06 OPEN CHANNELS

In many instances, special design or evaluation techniques will be required for stormwater conveyance. With exceptions as modified herein, all open channel criteria shall be in accordance with the Urban Drainage Manual, Volumes 1 and 2.

For the purpose of design in this section, all drainageways (major and minor) shall be designed using the Urban Drainage Manual, Volumes 1 and 2. Due to the complexities of open channels, there is a wide range of design options available to the engineer. The exact method of analysis and design shall be clearly documented and submitted as part of the Storm Drainage Study.

Flood control channels for major drainageways shall include a low-flow channel with a capacity to convey the average annual flow rate, or other appropriate flow rate as determined through a sediment transport and channel stability analysis, without excessive erosion or channel migration, with an adjacent overbank floodplain to convey the remainder of the 100-year flow. The channel improvement shall not cause increased velocities or erosive forces upstream or downstream of the improvement.

9-01-07 STORM SEWERS

Storm sewers are to be viewed as an integral part of all Minor Drainage Systems. The installation of storm sewer systems is required when the other parts of the minor system (i.e. curb, gutter and roadside ditches) no longer have capacity to accommodate the runoff from the minor storm or spread widths exceed those requirements presented in this section.

Except as modified herein, the design of storm sewers shall be in accordance with the Manual section on "Storm Sewers." The engineer is referred to the Manual and other references cited for additional discussion and basic design concepts.

The use of computer programs in the design of storm sewer systems will be permitted provided the model input and justifications are submitted to the County for review and approval.

9-01-07-01 CONSTRUCTION MATERIALS

All storm sewers within the county right-of-way shall be constructed using reinforced concrete pipe class III (RCP class III) and/or reinforced concrete box culverts (RCBC). If a pipe is installed by boring & jacking, RCP class V or equivalent shall be used. The required pipe strength shall be determined from the actual depth of cover, true load, and proposed field conditions. Typical design strength calculations shall be submitted as part of the Storm Drainage Study.

If corrosive soils are present, the designer shall incorporate appropriate measures to protect the pipe from damage.

Pipe joints shall be watertight and flexible gasket joints, both at pipe joints and for all pipe - structure connections.~~Pipe joints shall be watertight and flexible gasket joints, both between pipe sections and at manholes.~~ Pipe joints shall consist of resilient connections complying with the requirements of ASTM C-443 or ASTM C-923, as appropriate.

9-01-07-02 HYDRAULIC DESIGN

Storm sewers within the county right-of-way shall be designed to convey the minor storm runoff peaks without surcharging the sewer. To insure this objective is achieved, the hydraulic and energy grade lines shall be computed by calculating both the major and minor losses (i.e. friction, expansion, contraction, bend, and junction losses). The methods for estimating these losses are presented in the following sections and in the Manual. The final energy grade line shall be at or below the proposed ground surface.

9-01-07-03 PIPE FRICTION LOSSES

Manning n-values to be used in the calculation of storm sewer capacity and velocity are to be based on the material being proposed. Table 9.9 presents typical Manning n-values.

9-01-07-04 PIPE FORM LOSSES

Generally, between the inlet and outlet the flow encounters a variety of configurations in the flow passageway (i.e. changes in pipe size, branches, bends, junctions, expansions, and contractions). These variations of configuration impose losses in addition to those resulting from pipe friction. These form loss values shall be submitted, with full justification for the values chosen, as part of the Storm Drainage Study.

9-01-07-05 VERTICAL ALIGNMENT

The sewer grade shall be such that a minimum cover is maintained to withstand a live load conforming to AASHTO HS-20 (or as designated by the County) loading on the pipe. The minimum cover depends upon the pipe size, type and class, and soil bedding condition.

The minimum clearances between the proposed storm sewer, water main, and sanitary sewer (either above or below) shall be in accordance with the appropriate district and as discussed in section 7-06-03.

9-01-07-06 HORIZONTAL ALIGNMENT

The storm sewer alignment may be curvilinear for pipe with diameters of 48-inches or greater but only when approved by the Director of the Transportation Department. The applicant must demonstrate the need for a curvilinear alignment. The limitations on the radius for pulled-joint pipe are dependent on the pipe length and diameter, and amount of opening permitted in the joint. The maximum allowable joint pull shall be ¾ inch. The minimum parameters for radius type pipe are shown in Table 9.9. The radius requirement for pipe bends is dependent upon the manufacturer’s specifications.

Table 9.9—Storm Sewer Alignment and Size Criteria

Vertical Dimension Of Pipe (inches)	Maximum Allowable Distance Between Manholes and/or Cleanouts
18 to 36	400 ft
42 and larger	500 ft

Minimum Radius of Curvature for Radius Pipe

Diameter of Pipe	Radius of Curvature
48” to 54”	28.50 ft
57” to 72”	32.00 ft.
78” to 108”	38.00 ft.

Short radius bends shall not be used on sewers 42 inches or less in diameter

Minimum Pipe Diameter

Type	Minimum Equivalent Pipe Diameter	Minimum Cross-Sectional Area
Main Trunk	18 in	1.77 sf
*Lateral from inlet	18 in	1.77 sf

*Minimum size of lateral shall also be based upon a water surface inside the inlet with a minimum distance of 1 ft below the grate or throat.

Manning n-Value

Sewer Type	Capacity Calculation	Velocity Calculation
Concrete (newer pipe)	0.013	0.011
Concrete (older pipe)	0.015	0.012
Concrete (preliminary sizing)	0.015	0.012
Plastic	0.011	0.009

Reference: Manual

9-01-07-07 PIPE SIZE

The minimum allowable pipe size for storm sewers is dependent upon the estimated flows and a practical diameter from a maintenance perspective. In addition, the length of the sewer affects the maintenance and, therefore, the minimum diameter. Table 9.9 presents the minimum pipe size for storm sewers located in the County right-of-way.

9-01-07-08 MANHOLES AND MANHOLE COVERS

Manholes or maintenance access ports will be required whenever there is a change in size, direction, elevation, grade, or where there is a junction of two or more conduits. In addition, a manhole may be required at the beginning and/or at the end of the curved section of storm sewer. The maximum spacing between manholes for various pipe sizes shall be in accordance with Table 9.9. Refer to Table 9.10 for the required manhole size.

Table 9.10—Manhole Size

Sewer Diameter	Minimum Manhole Inside Diameter
18”	4’
21” to 42’	5’
48”	6’
54” and larger	As approved by Director of the Transportation Department

Larger manhole diameters or a junction structure may be required when sewer alignments are not straight or more than one sewer line goes through the manhole. Manhole diameter may be increased should conditions require such.

All lids/covers for storm sewer systems shall have the Adams County manhole cover design. Refer to Appendix C for this detail.

9-01-08 STORM SEWER INLETS

Presented in the following subsection is a discussion on the criteria and methodology for design and evaluation of storm sewer inlets in the county.

9-01-08-01 STANDARD INLETS

The standard inlets permitted for uses in the county are presented in Table 9.11. Other inlet types may be considered on a case-by-case basis.

All lids/covers for inlets shall have the Adams County manhole cover design. Refer to Appendix C for this detail.

Table 9.11—Inlet Types

Inlet Type	Permitted Use
Curb Opening Inlet Type R	All street types
Grated Inlet Type C or D	All streets with a roadside or median ditch
Grated Inlet Type 13	Alleys or private drives with a valley gutter (private areas only)
Combination Inlet Types 13 and 16	All street types

See standard detail drawings in Appendix C

9-01-08-02 INLET HYDRAULICS

The procedures and basic data to define the capacities of the standard inlets under various flow conditions shall be calculated or obtained from the Urban Drainage Manual, Volume 1, in the Section on "Storm Inlets." The engineer shall submit assumptions, and calculated inlet capacities as part of the Storm Drainage Study.

Inlet types and grates shall be selected to be appropriate for the intended use and location.

9-01-09 STREETS

Urban and rural streets, specifically the curb and gutter or the roadside ditches, should be viewed as an integral part of a Minor Drainage System. When the drainage in the street exceeds allowable limits, a storm sewer system or an open channel is required to convey the design flows. In addition, streets may be viewed as a critical part (subject to certain limitations) of the Major Drainage System when it conveys nuisance flows (flows less than minor events) quickly and efficiently to the storm sewer or open channel drainage without interfering with traffic movement. However, the primary function of urban streets is for traffic movement and therefore the drainage function is subservient to this traffic objective.

Design criteria for the collection and conveyance of surface runoff on public streets is based on a reasonable frequency and magnitude of traffic interference (see Table 9.12 through Table 9.14). That is, depending on the classification of the street, certain traffic lanes can be fully inundated during a major storm event. However, during lesser intense storms, runoff will also inundate traffic lanes, but to a lesser degree. The streets in the county are classified for drainage according to the average daily traffic (ADT) for which the street is designed. The larger the ADT, the more restrictive the allowable drainage encroachment into the driving lanes will be. The limits of storm runoff encroachment for each Drainage Classification and storm condition are presented in Table 9.12.

Table 9.12—Theoretical Design of Streets for Minor Storm Runoff

Drainage Classification	Maximum Theoretical Street Encroachment
Urban Industrial and Local Residential	No curb overtopping, but flow may spread to crown of street (flow may spread to back of sidewalk).
Collector	No curb overtopping and flow spread must leave at least one 10-foot lane free of water (5-feet on each side of the street crown).
Major Arterial and Minor Arterial	No curb overtopping and flow spread must leave at least two 10-foot lanes free of water (10-feet each side of the street crown or median).

Table 9.13—Allowable Use of Streets for Major Storm Runoff

Drainage Classification	Maximum Theoretical Depth
Local Industrial, Local Residential, and Collector	Building structures shall not be inundated at the ground line. The depth of water at street crown shall not exceed 6-inches.
Major Arterial and Minor Arterial	Building structures shall not be inundated at the ground line. To allow for emergency vehicles, the depth of water shall not exceed the street crown and 12-inches at the gutter flow line, whichever is more restrictive.

Table 9.14—Allowable Cross Street Flow

Drainage Classification	Minor Storm Maximum Depth	Major Storm Maximum Depth
Local Industrial and Local Residential	6-inches of depth in cross pan or at gutter flow line.	12-inches of depth in cross pan or at gutter flow line.
Collector	6-inches of depth at gutter flow line.	12-inches of depth at gutter flow line.
Major Arterial and Minor Arterial	None	6”
Cross street flow can occur in an urban drainage system under three conditions. One condition occurs when the runoff in a gutter spreads across the street crowns to the opposite gutter. The second is when cross-pans are used. The third condition occurs when the flow in a drainageway exceeds the capacity of a road culvert and subsequently overtops the crown of the street.		

9-01-10 CULVERTS

A culvert is defined as a conduit that conveys, by gravity, surface drainage runoff under a highway, railroad, canal, or other embankment (except detention outlets). Culverts come in many shapes and sizes, and are constructed of many different types of materials. For County roads serving new development, culverts shall be constructed using reinforced concrete pipe and/or reinforced concrete box culverts (RCBC). All roadway culverts shall be designed to a minimum AASHTO HS-20 loading criteria. Driveway culverts for residential properties may be allowed to use corrugated metal pipe and different loadings upon approval from the County,

9-01-10-01 CULVERT HYDRAULICS

The procedures and basic data to be used for the hydraulic evaluation of culverts being proposed for installation in the county shall be in accordance with the Urban Drainage Criteria Manual, Volume 2 for this section, except as modified herein.

The use of computer programs developed for the design of culverts will be permitted, provided the model input, justifications and related hand calculations are submitted to the County as part of the Storm Drainage Study.

9-01-10-02 INLET AND OUTLET CONFIGURATION

Within the county, all culverts are to be designed with headwalls and wing walls, or with flared-end sections at the inlet and outlet. Flared-end sections are only allowed on pipes with a diameter of 42 inches (or equivalent) or less. Additional protection at the inlet and outlet may be required to minimize the potential of channel erosion. Refer to Section 9-02 for erosion protection design guidelines. Adams County field inspection personnel shall be able to mandate additional erosion protection at culvert ends during construction if it is determined that the construction plans lack sufficient detail for erosion protection, or if field conditions require corrective action.

9-01-10-03 HYDRAULIC DATA

The design and evaluation of the capacity for a culvert shall be calculated using the appropriate methods. The computed culvert capacities must never exceed manufacturer’s recommendations or best engineering practices. The assumptions and model input shall be submitted as part of the Storm Drainage Study.

9-01-10-04 VELOCITY CONSIDERATIONS

In designing culverts, both the minimum and maximum velocities must be considered. Based on many publications, a flow velocity greater than approximately 3-fps is required to assure self-cleaning conditions exist and therefore reducing long-term maintenance costs. In addition, a velocity less than approximately 12-fps to minimize possible culvert damage due to scouring and downstream channel erosion.

9-01-10-05 CULVERT SIZING CONSIDERATIONS

The sizing of a culvert is dependent upon two factors, the street classification and the limits of allowable culvert overtopping. Limits for the various street classifications are presented in Table 9.15. The minimum culvert diameter shall be 18 inches. Unless under certain circumstances, the Director of the Transportation Department (or designated representative) may allow other sizes.

Table 9.15—Allowable Maximum Culvert Overtopping

Drainage Classification	Minor Drainage System Maximum Depth	Major Drainage System Maximum Depth
Local Industrial, Local Residential and Collector	No Overtopping	12-inches of depth at the gutter flowline (6-inches of depth at street crown for streets without gutters)
Major Arterial and Minor Arterial	No Overtopping	No Overtopping ($H/D \leq 1.5$)
The maximum headwater (H/D) for the 100-year design flows shall be 1.5 times the culvert diameter, or 1.5 times the culvert rise dimension for shapes other than round. Driveway culverts shall be designed using criteria outlined in Tables 9.12, 9.13, and 9.14.		

9-01-10-06 STRUCTURAL DESIGN

At a minimum, all culverts shall be designed to withstand an HS-20 loading (unless designated differently by the Director of the Transportation Department) in accordance with the design procedures of AASHTO, "Standard Specifications for Highway Bridges", and with the pipe manufacturer's recommendation. Using this loading requirement, calculations shall be submitted to confirm the estimated depth of cover and bearing load on the selected culvert.

9-01-11 BRIDGES

The hydraulic and hydrologic design of bridges within the county shall be in accordance with the Urban Drainage Criteria Manual Volume 2, "Structures, Section 4 - Bridges for this section. The Federal Highway Administration "Hydraulics of Bridge Waterways" or other county-approved resources shall also be used to determine the possible impacts on the drainageway (both upstream and downstream), scour potential and mitigation techniques for a proposed bridge structure. Based upon federal and state requirements, all new and replacement bridges shall comply with the floodplain regulations. Therefore, the engineer is encouraged to communicate with the Director of the Transportation Department prior to proposing the placement of a bridge structure within the County to obtain written approval.

Bridge plans shall require a separate review by a licensed professional engineer that specializes in structural design. The structural consultant will need to have county approval prior to review. The developer/applicant will be responsible for all costs associated with the structural consultant. The Director of the Transportation Department may also mandate inspection services by the structural consultant.

9-01-12 DETENTION

As stated in Section 9-01-03-11, onsite detention is required for all development or redevelopment projects. Requirements for detention storage of storm runoff shall be based on the location of the development within its major drainage basin as determined by hydrological modeling and surface characteristics. The detention storage facility shall be sized to hold the 5-year and the 100-year runoff, and water quality capture volumes. Surface water shall not be released from the development at rates greater than provided for in Table 9.16.

Exemptions from flood control detention requirements may be granted by the Director of the Transportation Department based upon the following criteria:

1. The total change in impervious area covers approximately 10,000 square feet or less; or
2. The site for which detention would be required is adjacent to a major drainageway where the ratio of major drainageway basin area to site area is 1000:1 or more; or
3. Rural residential subdivisions that consist of a lot split without the construction of roadways; or
4. Onsite flood control detention requirements for the control of runoff rates may be exempted where regional detention facilities are sized and constructed with the capacity to accommodate 100-year storm event flows from a fully developed basin and are publicly owned and maintained.

Exemptions from providing adequate water quality capture volume will not be granted.

9-01-12-01 VOLUME AND RELEASE RATES

The methods to be used in calculating the required detention volumes and maximum release rates are presented in the following section. These methods include empirical equations, tables, the CUHP method, or other computer aided models approved by the County. Early communication with the county is encouraged for the determination of the appropriate method and the level of detail required for submission.

9-01-12-01-01 *VOLUME ESTIMATES (EMPIRICAL FORMULA METHOD)*

The volume available for detention storage for tributary catchments of 90 acres or less shall be based on the following empirical equations that follow. For larger catchments a CUHP hydrograph shall be generated and hydrologic routing shall be used for site detention. The maximum release rates for detention design provided in Table 9.16 shall not be exceeded.

$$V=KA \qquad \text{Equation 9.5}$$

For the 100-year:

$$K_{100} = \frac{\left(1.78I - 0.002I^2 - 3.56\right)}{910} \qquad \text{Equation 9.6}$$

For the 5-year:

$$K_5 = \frac{\left(0.77I - 2.26\right)}{1000} \qquad \textit{Equation 9.7}$$

In which,

V = Required volume for the 100- or 5-year storm, acre-feet
A = Tributary catchment area, acres
I = Developed basin imperviousness, percent (%)

Adams County requires the WQCV be added to the 5-year detention volume. Adams County also requires that 50% of the WQCV be added to the calculated 100-year Volume.

An additional one-foot of depth must be added to the overall volume to accommodate for freeboard. Administrative relief for exemptions or reductions in freeboard requirements may be granted by the Director of the Transportation Department.

These empirical equations were developed as part of the UDFCD hydrology research program and were based on a computer modeling study and represent average conditions. It is believed these equations provide consistent and effective approaches to sizing onsite detention facilities. For basins larger than 90 acres, the CUHP computer model may be used to more accurately represent site conditions.

9-01-12-01-02 *VOLUME ESTIMATES (COMPUTER AIDED METHOD)*

Using a computer aided hydrology/hydraulics model the engineer can develop hydrographs that route flows to and away from the proposed detention facility. The routed or inflow hydrograph will represent the total volume of runoff from that particular rain event(s) while the outflow hydrograph represents the maximum allowable release rate permitted in Table 9.16. From this volume information plus the required freeboard, the design of the proposed facility may be performed. Using this method, the typical basin and outlet are designed from a detailed comparison of existing and proposed topographic information and downstream conditions. Although the County has helped to fund the UDPOND model for the design of detention and subscribes to its use, it recognizes many different computer models are available for this type of design. It will be the responsibility of the engineer to document and justify their use and the input and output parameters. These parameters and a detailed discussion on the method used for this design will be submitted as part of the Storm Drainage Study. The computer model must be approved by the County prior to review.

9-01-12-02 MAXIMUM ALLOWABLE RELEASE RATE

The maximum allowable release rates for the corresponding storm events (5 and 100-year) are as presented in Table 9.16.

Table 9.16—Allowable Release Rates (CFS/Acre)

Control Frequency	Dominant Soil Group		
	A	B	C & D
5-year	0.07	0.13	0.17
100-year	0.50	0.85	1.00

When using the empirical formula or a composite CUHP method, the predominate soil group for the total basin area contributing runoff to the detention facility will be used in determining the allowable release rate. However, when designing a facility using another type of computer aided model, the engineer shall select the soil group that best represents the surface characteristics of each sub-basin. The selected soil group(s) will be submitted as part of the Storm Drainage Study. In

the event that the local drainage system lacks capacity to accommodate the 5-year release rate, a smaller release rate may be required by the County.

9-01-12-03 DETENTION BASIN OUTLET/OUTFALL

Selecting the most appropriate outlet configuration requires a detailed design, which insures the maximum release rate meets the requirements of the project and includes proper provisions for maintenance and reliability. In addition, care shall be taken as to insure the designed outlet will not cause downstream erosion or damage during the storm events less than or equal to the major storm. The following lists five typical outlet structures for use in the design of a detention facility depending on the conditions, storage structure design and discharge rates:

1. Circular Culverts
2. Rectangular Culverts
3. Orifices
4. Weirs
5. Orifice Plates

Example details of each of these outlet structures is presented in the Manual, Volume I, in the Section on "Outlet Structures" or other published references. The engineer shall select the preferred outlet structure based on criteria presented in this section or other references and will present back up information in the Storm Drainage Study.

The outlet shall be designed to minimize unauthorized modifications which affect proper function. To assist in this effort, a sign with a minimum area of 0.75 square feet shall be attached to the outlet or posted nearby with the following message:

"WARNING
Unauthorized modification of
this structure is a code violation
and subject to penalties as
provided by law."

9-01-12-04 DETENTION METHODS

In addition to the general sizing, performance, and outlet configuration criteria presented above, the method of detention varies depending on the catchments of where the facility is to be constructed, such as open space detention, underground detention and the downstream drainage characteristics.

Storage yards used as detention ponds are not covered under this section and will be handled on a case-by-case basis. Projects proposing this type of detention facility shall contact the Transportation Department for determination of feasibility and submittal requirements prior to submitting an application. Control of trash when leaving the site shall be fully addressed.

9-01-12-04-01 *DESIGN STANDARDS FOR DETENTION*

The following section presents additional design standards (depth of freeboard, location planning, grading, and revegetation) for an open space detention facility. The location, size and landscaping should be properly coordinated with the proposed project and surrounding areas.

9-01-12-04-01-01 *Depth of Freeboard*

The minimum required freeboard for open space detention facilities is one-foot above the computed 100-year water surface elevation.

The planning of a detention facility is very critical in assuring the facility meets the volume requirements for the proposed project and is properly located for long term operations and maintenance. The facility should be constructed in an area that best fits the existing and proposed topography, facilitates the coordination with other regional facilities and where the building of habitat structures downstream is easily prohibited.

As part of the submitted project plans, the engineer shall accurately represent the location of the facility including limits of grading, approximate embankment slopes, and invert elevations for the outlet. In addition, a larger scale or regional map shall be supplied to show where the facility will discharge and how it interacts with existing or proposed regional facilities. Drainage easements shall be provided for detention facilities. Access easements shall also be provided to ensure maintenance access to detention ponds.

9-01-12-04-01-02 *Grading*

Pond grading shall not be steeper than (4) four horizontal and (1) one vertical for side slopes. Any dam constructed for the purpose of storing water or having a surface area, volume, or dam height as specified in Colorado Revised Statues 37-87-105, shall require the approval (in writing) of the State Engineer's Office prior to submission to the County.

~~All detention facility embankments shall be protected from catastrophic failure due to overtopping. Overtopping can occur when the pond outlets become obstructed or when an event larger than 100-year storm occurs. Failure protection for the embankment must be provided in the form of a buried heavy riprap layer on the entire downstream face of the~~

~~embankment or a separate emergency spillway having a minimum capacity of twice the maximum release rate for the 100-year flood. The proposed flow path for the discharge from the emergency spillway shall be directed into public right-of-way or into a major drainage way and shall be clearly depicted on the plans. Structures shall not be permitted in the path of the emergency spillway or overflow. The invert of the emergency spillway shall be set equal to or above the 100-year water surface elevation.~~

All detention facility embankments shall be protected from catastrophic failure due to overtopping. Overtopping can occur when the pond outlets become obstructed or when an event larger than the 100-year storm occurs. Failure protection for the embankment, downstream of the emergency spillway, must be provided in the form of a buried heavy riprap layer on the entire downstream face of the embankment, or by a separate emergency outfall. The emergency spillway, or emergency outfall, shall have a minimum capacity of twice the pond inflow rate for the 100-year storm. The emergency spillway, or emergency outfall, shall be clearly depicted on the plans. It is the Engineer's responsibility to ensure downstream properties are not adversely affected by drainage. The proposed flow path for the discharge from the emergency spillway, or emergency outfall, shall be as approved by the County. Structures shall not be permitted in the path of the emergency spillway or emergency outfall. The invert of the emergency spillway, or emergency outfall, shall be set equal to or above the 100-year water surface elevation. The minimum required freeboard for open space detention facilities shall be at least one-foot above the computed weir flow water surface elevation at the emergency spillway, or the emergency outfall.

Depending on site conditions and characteristics, the Director of the Transportation Department may grant administrative relief on slope requirements. The Applicant shall submit good and sufficient documentation sealed by a Colorado Registered Professional Engineer describing the site conditions that necessitate the need for relief and that the proposed slopes are stable and not susceptible to erosion in order to be considered for relief.

9-01-12-04-01-03 *Trickle Channel*

Concrete trickle channels shall be used by the design engineer when appropriate. Design of trickle channels shall be in accordance with Volume 1 of the Manual.

9-01-12-04-01-04 *Revegetation*

All detention facilities shall be revegetated with irrigated sod, natural dry-land grasses, or equivalent. In addition, an erosion control blankets may be required by the county to maintain the slopes prior to vegetation maturation. The engineer shall submit the proposed revegetation plan to the County.

9-01-12-04-02 *PARKING LOT DETENTION*

The following section presents additional design standards (depth of ponding, location planning, grading and resurfacing) for parking lot detention facilities. The location and size should be properly coordinated with the proposed project and surrounding areas as to minimize the possibility of downstream damage.

9-01-12-04-02-01 *Depth Limitation*

The maximum allowable design depth of the ponding for the 100-year flood is 12-inches. No parking lot detention will be allowed for storm events less than or equal to a 5-year return period, or water quality capture volume.

9-01-12-04-02-02 *Location Planning*

The planning of a parking lot detention facility is very critical in assuring the proposed facility not only meets drainage requirements, but also meets project objectives for parking. Unlike open space detention, which is constructed in an area that best fits the existing and proposed topography and expedites the coordination with other regional facilities, parking lot detention facility may not always be in the best location for drainage due to trade-offs with parking objectives. Therefore, additional conveyance structures may be required to insure positive drainage from the site is maintained.

As part of the submitted project plans, the engineer shall accurately represent the location of each facility including limits of grading, approximate embankment slopes, and invert elevations for the outlet.

9-01-12-04-02-03 *Grading*

To insure the proposed parking lot properly performs as a detention basin, a minimum slope of 0.5 percent slope is recommended, and cross-pans/concrete swales installed as necessary to direct flow towards the outlet. In addition, most parking lot detention facilities are typically surrounded by curb and gutters and not earthen embankments; therefore

grading of the overall parking lot and adjacent areas becomes critical in storing runoff in excess of 6-inches. Because of this fact, a detailed grading plan must be prepared.

9-01-12-04-02-04 *Resurfacing*

As part of the overall detention design, the engineer shall take into account future parking lot resurfacing operations in estimating the available detention storage volume. At a minimum, the engineer will provide additional volume that may be lost by 2 inches of overlay.

9-01-12-04-03 *UNDERGROUND DETENTION*

Underground detention is generally discouraged and will only be allowed when ALL other options have been proven to be insufficient. Under no circumstances will the County accept underground detention at a publicly owned facility. However, if an owner must use this technique, to the owner will be responsible for maintenance, the facility will be allowed if approval to do so is obtained in advance and the facility is designed according to the criteria outlined in this section or as specified by the Director of the Transportation Department.

9-01-12-04-03-01 *Configuration*

Pipe segments shall be sufficient in number, diameter (minimum 36-inches), and length to provide the required minimum storage volume for the 100-year design. As an option, the 5-year design can be stored in the underground pipe segments and the remaining volume of the 100-year storm event stored aboveground in an open space or parking lot detention facility.

The pipe segments shall be placed side by side and connected at both ends by elbow tee fittings and across the fitting at the outlet. The pipe segments shall be continuously sloped at a minimum of 0.25% to the outlet. Manholes for maintenance access shall be placed in the tee fittings and in the straight segments of the pipe, when required. See County standard drawing in Appendix A.

Structural fill/gravel backfill for underground detention facilities shall be designed with a porosity not to exceed 30%, unless approved by the county engineer.

Permanent buildings or structures shall not be placed directly above the underground detention.

9-01-12-04-03-02 *Materials*

When constructing an underground detention facility within the county, the engineer shall design the system using one of the appropriate materials. The required pipe strength shall be determined from the actual depth of cover, true load, and proposed field conditions. Typical design strength calculations for an HS-25 loading condition shall be submitted as part of the Storm Drainage Study.

9-01-12-04-03-03 *Maintenance Access*

Access to the detention facility shall be provided in accordance with this section. To facilitate cleaning of the pipe segments, 3-feet diameter maintenance access ports shall be placed according to the schedule in Table 9.16.

Table 9.16—Underground Detention - Maintenance Access Requirements

Detention Pipe Size	Maximum Spacing	Minimum Frequency
36” to 54”	50’	Every pipe segment
60” to 66”	75’	Every other pipe segment
>66”	100’	One at each end of the battery of pipes

9-01-12-05 FLOOD HAZARD WARNING

In addition, all parking lot/storage lot detention areas shall have a minimum of two signs posted identifying the detention pond area. The signs shall have a minimum area of 1.5 square feet and contain the following message:

“Warning
This area is a detention basin and is subject
to periodic flooding to a depth of approximately 12 inches.”

9-01-13 RETENTION

All storm water mitigation ponds, including retention, must be designed to drain completely completely within 72-hours. As stated in elsewhere in this Section, onsite retention will only be allowed where ALL possible means of storage and/or conveyance have been exhausted for a particular development, or redevelopment project. Requirements for retention storage of storm runoff shall be based on the criteria presented in this section and compared to hydrological modeling. The County

will require retention of the runoff from a 24-hour, 100-year storm event under fully developed conditions (including runoff from adjacent streets whether they are existing or proposed).

Acceptable alternatives to these requirements may include:

1. When written agreements among landowners exist wherein historic flow rates are exceeded by upstream landowners and will be accepted by downstream landowners. Such agreements are subject to review by the Director of the Transportation Department.
2. The developer is providing offsite drainage improvements to convey stormwater to acceptable outfall points.

9-01-13-01 MINIMUM RETENTION VOLUME

The minimum retention volume shall equal the runoff from a 4.80-inch storm event. This volume may be calculated by either using the empirical formula presented in Equation 9.8 or a computer aided hydrology/hydraulics model. No credit shall be given for infiltration in establishing the minimum volume.

$$\mathrm{Re}\,t_{Vol}\,(ft^3) = \frac{4.80}{12} I_{mp} A \qquad \text{Equation 9.8}$$

Where

I_{mp} = Developed basin imperviousness
A = Tributary area, sq. ft.

9-01-13-02 EMERGENCY SPILLWAY

An overflow section shall be provided for the retention facility that will protect embankments from overflow resulting from a 100-year storm assuming the retention basin is full and the tributary area is fully developed.

9-01-13-03 POND DESIGN

Pond grading shall not be steeper than (4) four horizontal and (1) one vertical for side slopes. Administrative relief from slope requirements may be granted by the Director of the Transportation Department in accordance with the provisions of these Standards and Regulations.

9-01-13-04 FREEBOARD

A minimum of one (1) foot of freeboard shall be added to the maximum retention volume water surface. Reductions in freeboard requirements may be granted by the Director of the Transportation Department on a case-by-case basis as supported by sufficient technical justification.

9-01-13-05 REVEGETATION

All open space retention facilities shall be revegetated with either irrigated sod or natural dry-land grasses, or equivalent. In addition, the county may require an erosion control blanket to be placed on the slopes prior to vegetation maturation. The engineer shall submit the proposed revegetation plan to the County.

9-01-13-06 EFFECTS ON LOCAL GROUNDWATER

The engineer must evaluate or assess the impacts of the retention facility on local groundwater levels, and the potential for damage to nearby properties. In addition, increasing local groundwater levels to a point where standing water within the retention facility occurs may create a wetland area that requires additional permitting and long-term maintenance requirements.

9-01-13-07 SLOW RELEASES

A slow release will be permitted of 0.25 cfs or less if the small flows will not cause nuisance conditions such as ponding or icing on roadways.

9-01-13-08 ACCESS AND MAINTENANCE EASEMENTS

A drainage maintenance easement shall be granted to the County to ensure that emergency maintenance and access can be legally provided to keep the facility operable. This easement may only be reduced when the retention pond is converted to detention due to downstream conveyance availability.

A separate access easement may be required by the county to ensure maintenance access to ponds.

9-02 STORMWATER QUALITY REGULATIONS AUTHORITY

These standards and regulations are authorized by Section 30-15-401.11, et seq., C.R.S.

9-03 STORMWATER QUALITY REGULATIONS DEFINITIONS

The definitions listed in this section shall apply only to the Stormwater Quality Regulations. The words and terms used in this Section for Stormwater Quality Regulations shall have the meanings set forth below. If a definition is not included in the Section listed below then the definition listed in Chapter 11 of the Adams County Development Standards and Regulations shall govern. If there is a conflict between the definitions in Chapter 11 and the definitions in this Section then the definitions in this Section shall prevail. If the term is not found in these Regulations or in Chapter 11, the term shall have its common meaning.

9-03-01 **Adequate:** Lawfully sufficient, fulfilling a requirement and functioning as designed.

9-03-02 **Best Management Practices (BMPs):** A technique, process, activity, or structure used to reduce pollutant discharges in stormwater. BMPs include source control practices (non-structural BMPs) and engineered structures designed to treat runoff. BMPs are most effective when used in combination and selected and designed based on site-specific characteristics.

9-03-03 **Conditional Acceptance:** County review of the Erosion and Sediment Control Plan with the condition that the Erosion and Sediment Control Plan is considered a living document and will change due to unforeseen issues or if the submitted plan does not function as intended.

9-03-04 **Colorado Discharge Permit System (CDPS):** The State of Colorado's system of permitting discharges (e.g., stormwater, wastewater) to Waters of the State that correspond to the federal NPDES permits under the federal Clean Water Act.

9-03-05 **Contractor:** An individual or company that is responsible for construction.

9-03-06 **Construction Activities:** Clearing, grading, excavation, demolition, utility work, paving, building, haul roads, access roads, staging areas, heavy traffic areas, stockpiling of fill materials, borrow areas and other ground disturbance activities that contribute to the disturbance of land and increases the impact of pollutants associated with environmental impacts. Construction activities do not include routine maintenance performed by public agencies, or authorized agents to maintain original line grade, hydraulic capacity, or original purpose of the facility.

9-03-07 **Deficient BMPs:** A BMP that is lacking in some necessary quality or element in order to function as designed.

9-03-08 **Development:** any activity, excavation or fill, alteration, subdivision, change in land use, or practice, undertaken by a private entity that affects the quality of the discharge of stormwater runoff.

9-03-09 **Disturbance:** Any construction activity that could increase the rate of erosion.

9-03-10 **Erosion:** A process by which soil particles are detached and transported by wind, water, and gravity to a down wind, down slope or downstream location.

9-03-11 **Erosion Control Measures:** Source controls used to limit erosion of soil at construction sites and other erosion-prone areas. Representative measures including surface treatments that stabilize soil that has been exposed due to excavation or grading and flow controls that redirect flows or reduce velocities of concentrated flow.

9-03-12 **Erosion and Sediment Control Plan (ESC Plan):** A written plan and associated details required under regulations and necessary to obtain a stormwater quality permit. This plan identifies measures that will be implemented to control erosion, prevent sediment from traveling outside the permitted area and minimize the discharge of pollutants in stormwater. Requirements for the ESC Plan are specified in the Adams County Stormwater Quality Regulations.

9-03-13 **Final Stabilization:** When all ground surface disturbing activities at the site have been completed, and uniform vegetative cover has been established with an individual plant density of at least 70 percent of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed.

9-03-14 **General Pollution Prevention BMPs:** Measures that are implemented to minimize or prevent general contamination, of the construction site; and nearby natural resources from entering into the MS4.

9-03-15 **Illicit / Illegal Discharge:** Any discharge to the municipal separate storm sewer system that is not composed entirely of stormwater, is not authorized by Federal, State or County permit, and is not considered an allowable discharge.

9-03-16 **Inadequate BMPs:** A BMP that is used in the wrong application, is not capable, or does not have the capacity to function as designed.

9-03-17 **Infrastructure:** A conveyance system (such as storm sewer, gutter, culvert, roadside ditch) constructed for the purpose of conveying storm water. Infrastructure can be both publicly owned and maintained or privately owned and maintained.

9-03-18 **Legally Responsible Person:** An owner or developer who is operating as the site manager or otherwise has supervision and control over the site, either directly or through a contract.

9-03-19 **Local Contact:** A Contractor or subcontractor with contractual responsibility or operational control (including ESC Plan implementation) to address the impact construction activities may have on stormwater quality.

9-03-20 **Materials Management Practices:** Source control practices at construction sites intended to limit contact of runoff with pollutants such as construction materials, equipment-related fluids, stockpiles and proper storage. By intentionally controlling and managing areas where pollutants are handled, reducing the likelihood of these materials being transported to the MS4.

9-03-21 **Minimum Control Measures:** Stormwater management activities required under Phase II MS4 permits. The six minimum control measures include 1) public education and outreach, 2) public participation and involvement, 3) illicit discharge detection and elimination, 4) construction site stormwater runoff control, 5) post-construction stormwater management, and 6) pollution prevention and good housekeeping for municipal operations.

9-03-22 **Municipal Separate Storm Sewer System (MS4):** Any public owned conveyance or system of conveyances of stormwater that discharge to State Waters and is designed for or used for collecting or conveying stormwater. An MS4 is not a combined sewer, and is not part of a publicly owned treatment works (POTW). Examples include roadside ditches, curbs, gutters, channels, catch basins, municipal streets, storm drain system (pipes, manholes, culverts, inlets).

9-03-23 **MS4 Permit:** A state or federal stormwater discharge permit that regulates discharges from municipal separate storm sewer system (MS4) for compliance with the Clean Water Act regulations.

9-03-24 **Notice of Violation:** A notification given by the County to the Permittee that indicates the Permittee is in violation with County Regulations.

9-03-25 **National Pollutant Discharge Elimination System (NPDES):** The national program under Section 402 of the Clean Water Act for regulation of discharges of pollutants from point sources to waters of the U.S.

9-03-26 **Non-Structural BMPs:** Stormwater BMPs that focus on management of pollutants at their source by minimizing exposure to runoff, rather than treating runoff in constructed facilities. Non-structural BMPs are used as source controls.

9-03-27 **Part of a larger common plan of development or sale:** A contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules.

9-03-28 **Permitted Area, Stormwater Quality Permit:** The area (acre) surrounded by a line which disturbance is allowed to take place. Within an area designated by the boundary line shown on the Erosion and Sediment Control Plan.

9-03-29 **Point Source Pollution:** Pollutants from a single, identifiable source such as a factory, refinery, or place of business. In the context of TMDLs, point sources typically include NPDES permitted sanitary wastewater treatment facilities, municipal separate storm sewer systems, and confined animal feeding operations.

9-03-30 **Pollutant (as defined by CDPS Regulation 6.3.0[51]):** Any dredged spoil, dirt, slurry, solid waste, incinerator residue, sewage, sewage sludge, sediment, garbage, trash, chemical waste, biological nutrient, biological material, radioactive material, heat, wrecked or discharged equipment, rock, sand, or any industrial, municipal or agriculture waste.

9-03-31 **Recalcitrant:** Not responsive to more than two or more instances of non-compliance notices of violation with the Stormwater Quality Regulations.

9-03-32 **Redevelopment:** Improvements to an existing developed area, typically involving removal of existing structures and construction of new buildings and associated Infrastructure. Depending on the scale of the redevelopment activity, post-construction stormwater permit requirements may be triggered.

9-03-33 **Regulations:** A collection of authoritative rules or orders issued by a government and having the force of law.

9-03-34 **Retention Pond:** A BMP consisting of a permanent pool of water designed to treat runoff by detaining water long enough for settling, filtering, and biological uptake. Also known as a wet pond, these ponds may also be designed to have an aesthetic and/or recreational value. These BMPs have a permanent pool of water that is replaced with stormwater, in part or in total, during storm runoff events. Retention ponds require a perennial supply of water to maintain the pool and are typically used on larger sites.

9-03-35 **Runoff:** Water in liquid form from rain, melted snow, or irrigation that flows over the land surface.

9-03-36 **Sediment:** The solid matter that settles to the bottom of a liquid or remaining after water has evaporated that is deposited by water or wind.

9-03-37 **Sediment Control Measures:** Practices that reduce transport of sediment off a site to downstream properties and receiving waters. Sediment controls generally either provide filtration through a permeable media or slow or detain runoff to allow sediment to settle out of the runoff. Sediment controls are measures implemented when erosion has the potential to occur due to ground disturbance.

9-03-38 **Small Construction Site:** A construction site that disturbs 1 to <5 acres of area.

9-03-39 **Source Controls:** A variety of practices implemented to minimize pollutant transport in runoff by controlling pollutants where they originate and/or accumulate. Representative source controls include good housekeeping measures, landscape management practices, pet waste controls, public education regarding household hazardous waste, covering outdoor storage area, etc.

9-03-40 **Spill Prevention Control and Countermeasure (SPCC) Plan:** A written plan and associated graphics prepared for an industrial, commercial or construction operation identifying measures to minimized the likelihood of a spill and to expedite control and cleanup activities should a spill occur.

9-03-41 **Stabilization:** To minimize the potential for soil erosion, by promoting uniform cover of all disturbed surfaces, either with a vegetative cover or hard surface cover.

9-03-42 **Steep Slope:** A slope that is 3 ft horizontal to 1 ft vertical (3:1) or steeper.

9-03-43 **Stormwater:** Precipitation-induced surface runoff.

9-03-44 **Stormwater Quality Inspector:** The person or person(s) authorized by the Board of County Commissioners to inspect a construction site for the purpose of determining compliance with the provisions of this chapter of these regulations.

9-03-45 **Stormwater Quality Permit:** Adams County's permit that allows discharges of stormwater to the County's MS4 that corresponds to the state CDPS permits under the Colorado Water Quality Control Act.

9-03-46 **Structural BMPs:** Engineered structures constructed to provide temporary storage or treatment of stormwater runoff.

9-03-47 **Systematic Violations:** Regular infringement of the Stormwater Quality Regulations.

9-03-48 **Waste Management Controls:** A variety of practices implemented to minimize or prevent contamination of the natural resources present from waste materials.

9-03-49 **Waters of the State of Colorado:** Any and all surface waters which are contained in or flow in or through the State of Colorado. This does not include waters in sewerage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed. This definition includes water courses that are usually dry.

9-03-50 **Waters of the United States:** All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide. Waters of the U.S. include all interstate waters and intrastate lakes, rivers, streams (including intermittent streams), mudflats,

sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. (See 40 CFR 122.2 for the complete definition).

9-04 STORMWATER QUALITY REGULATIONS GENERAL INFORMATION

Protecting the quality of stormwater runoff to State Waters is a priority to Adams County and is required by the Colorado Discharge Permit System (CDPS) Regulations. The regulations described in this chapter are pursuant to Adams County Resolution 2003-02-19-06, Feb. 19, 2003. The Colorado Department of Public Health and Environment (CDPHE), Water Quality Control Division (WQCD), through the Municipal Separate Storm Sewer System (MS4) permit issued to Adams County, requires Adams County to control and reduce the discharge of pollutants to protect stormwater quality and to satisfy the appropriate water quality requirements of the Colorado Water Quality Control Act (25-8-101 et. seq., C.R.S) and the Colorado Discharge Permit Regulations (Colorado Regulation No. 61).

9-04-01 REGULATORY HISTORY

Congress passed the Clean Water Act in 1972. The Act prohibited the discharge of pollutants to Waters of the United States from any point source, unless the discharge was in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The focus of the NPDES program was on non-stormwater discharges from industries and municipal wastewater treatment plants.

However, the Clean Water Act was revised in 1987 and defined municipal and industrial stormwater runoff discharges as a “point source”. A two-phase permitting strategy was established to implement the NPDES program for stormwater discharges; classification is based on the 2000 census. Phase I of the NPDES program affected municipal separate storm sewer systems (MS4s) serving a population greater than one hundred thousand (100,000). Phase II of the NPDES program affected MS4s serving a population between ten thousand (10,000) and one hundred thousand (100,000) with urban areas of 1,000 or more people per square mile.

Adams County is included under the Phase II regulations as published in the Colorado Water Quality Control Act Regulation 61, as amended.

9-04-02 PURPOSE

Sections 9-02 to 9-09 of the Adams County Stormwater Quality Regulations set forth the minimum criteria to be met on construction sites.

1. The following state regulations are required and what Adams County to must implement to ensure compliance with the Adams County CDPS Stormwater MS4 Permit COR-090041 Illicit Discharge Detection and Elimination, Construction Site Runoff Control and Post-Construction Runoff Minimum Control Measures.

Illicit Discharge Detection and Elimination – The permittee (Adams County), "must develop, implement, and enforce a program to detect and eliminate illicit discharges into the permittee's MS4. Illicit discharges do not include discharges or flows from emergency fire fighting activities, or other activities specifically authorized by a separate CDPS permit."

Construction Site Runoff Control – The permittee (Adams County), "must develop, implement, and enforce a program to reduce pollutants in any stormwater runoff to the MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of pollutants in stormwater discharges from construction activity disturbing less than one acre must be included in the program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more."

Post-Construction Stormwater Management in New Development and Redevelopment – The permittee (Adams County), "must develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the MS4."

These Regulations establish stormwater quality design, establishes the use of temporary and permanent structural and non-structural practices, maintenance of such practices and violations of these Regulations.

9-04-03 GENERAL REQUIREMENTS

Any person who undertakes or causes to be undertaken any activity, which involves disturbance of the surface of land shall ensure that soil erosion, sedimentation, increased pollutant loads and changes to water flow characteristics resulting from their activity's are controlled so as to minimize pollution of receiving waters.

9-04-04 QUALIFICATIONS

Nothing under these Regulations shall be deemed or construed as lessening or modifying the ultimate responsibility of such persons that hold an Adams County SWQ Permit. Nor do the Adams County Stormwater Quality Permit requirements or the Stormwater Quality Regulations imply the assumption of any liability therefore on the part of the County.

Adams County Stormwater Quality Regulations are to be interpreted as minimum standards and regulations. These regulations are not adequate to comply with the requirements of the State CDPS Stormwater Construction Permit.

9-05 STORMWATER QUALITY PERMIT

9-05-01 APLICABILITY

All construction activity within the MS4 Permitted area that disturbs one (1) or more acres, or is part of a larger common plan of development or sale, shall obtain permit coverage under the Adams County Stormwater Quality Permit (SWQ Permit), as amended. This includes all construction activities.

When a construction site disturbs less than one (1) acre and is not part of a larger common plan of development or sale, neither a SWQ Permit nor an Erosion and Sediment Control Plan is required by the County, however a small site erosion and sediment control plan is required.

A small site erosion and sediment control plan shall be specific to the project site and is required to obtain a County building permit. This plan is a drawing depicting the project site with the locations of all temporary BMPs is required to obtain a building permit. In addition, the associated BMP details to be used shall be included.

Prior to issuing an Adams County SWQ Permit, the applicant must:

1. Submit an Erosion and Sediment Control Plan to Adams County Transportation Department for review using the County's Erosion and Sediment Control Plan Template and Details that are recommended in the supplemental stormwater guide, and attach to relevant site plans.
2. Provide a copy of the State CDPS Stormwater Construction Permit Certification page.
3. Provide financial assurance to ensure that the site will achieve final stabilization by submitting the BMP Cost Estimate form.

9-05-01-01 OIL AND GAS SITES

All oil and gas sites shall comply with the Colorado Oil and Gas Conservation Commissions Rules and Regulations, specifically 1000 Series Reclamation Regulations. All oil and gas sites constructed within the County's MS4 permitted area shall comply with and will be inspected by the County for these Stormwater Quality Regulations.

9-05-01-02 COUNTY CAPITAL IMPROVEMENT PROJECTS

All qualified County capital improvement projects are required to obtain a State CDPS Stormwater Construction Permit. To do this, the county shall require contractor's to prepare and implement a Stormwater Management Plan. A County SWQ Permit is waived; however, compliance with the State CDPS Stormwater

Construction Permit shall describe in the project specifications that are part of the project contract.

9-05-02 AUTHORITY

Under the County's CDPS MS4 Permit, Adams County requires a stormwater control site plan, otherwise called an Erosion and Sediment Control Plan (ESC Plan). The County ensures that construction activities are in compliance with County Stormwater Quality Regulations by requiring that an ESC Plan be submitted and reviewed for adequacy by the County, and by requiring a copy of the State CDPS Stormwater Construction Permit Certification page prior to receiving a County SWQ Permit.

Enforcement of the Adams County Stormwater Quality Regulations and the County SWQ Permit are the responsibility of the Adams County Transportation Department – Stormwater Regulatory Compliance Unit; refer to Section 9-07-05 Stormwater Quality Regulation Violations.

Transportation Department – Stormwater Regulatory Compliance Unit (SRC Unit) is hereby authorized to sign off on the County SWQ Permit and associated County permits (e.g. Building, Right-of-Way, Grading and Drainage, etc.) with a stormwater signature line once all conditions of the development application process have been met as required in Section 9-05 Stormwater Quality Permit.

In order for the SRC Unit to sign off on a Certificate of Occupancy, the associated, overall site shall be in compliance with the Stormwater Quality Regulations. Sites that are under an enforcement action will not receive a sign off by the SRC Unit.

9-05-03 ILLICIT DISCHARGES

No person shall cause, allow, or contribute to the discharge of pollutants into the County's MS4 as this constitutes a Stormwater Quality Regulation Violation and a violation of County Ordinance No. 11 Concerning Illicit Discharges to the Waters of the State within Unincorporated Adams County.

Sediment or any other pollutant that goes outside the permitted area is considered a violation of the Stormwater Quality Regulations.

9-05-04 STORMWATER GUIDANCE

Throughout these regulations one will find reference to a supplemental stormwater guide. This guidance document is separate from the regulations as it

consists of but not limited to, stormwater details and waste management plan guidance, which is frequently updated to reflect industry standards.

A current copy of this guidance document will be posted on the County's website. If one doesn't have access to the internet, contact the Transportation Department Department.

9-05-05 PERMITTEE COMPLIANCE

All County Stormwater Quality Permit holders shall comply with all responsibilities, requirements, terms and conditions of the Stormwater Quality Permit and Adams County Stormwater Quality Regulations provided herein, as amended.

9-05-05-01 SUBMITTALS

Each Stormwater Permit Application shall be submitted to the Transportation Department and shall include submittal requirements for said project proposal.

Prior to issuing the Adams County Stormwater Quality Permit (SWQ Permit), the applicant must:

1. Submit an ESC Plan to Adams County Transportation Department for review using the County's Erosion and Sediment Control Plan Template and Details in found in the supplemental stormwater guide.
2. Provide a copy of the State CDPS Stormwater Construction Permit Certification page.
3. Provide financial assurance to ensure that the site achieve final stabilization.

9-05-05-02 SITE INSPECTIONS

The Permittee shall perform and document site stormwater inspections at minimum once every fourteen (14) days during active construction and within 24-hrs post-precipitation events that cause surface erosion.

Adams County requires the Permittee to inspect for evidence of, or the potential for, pollutants leaving the construction site permit boundaries, entering into the MS4, or discharging into State Waters. All erosion and sediment control practices identified in the ESC Plan shall be evaluated to ensure that they are installed, maintained and operating correctly.

The Permittee shall make a thorough inspection of their construction site at least once every month once all construction activities have been completed.

9-05-05-03 INSPECTION REPORT/RECORDS

The Permittee shall keep a record of inspections. Inspection reports must identify any incidents of non-compliance with the terms and conditions of the SWQ Permit. At a minimum, the inspection report shall include:

1. Inspection date;
2. Names(s) and titles(s) of personnel making the inspection;
3. Locations(s) of any discharges of pollutants outside the Permit Boundary;
4. Location(s) of BMPs that need to be maintained;
5. Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
6. Location(s) where additional BMPs are needed that were not in place at the time of inspection;
7. Description of all BMP corrective actions and the date corrected; and
8. Document when the BMPs are no longer necessary and are removed; and
9. Signed Certification Statement; and
10. Update the ESC Plan for all changes representing BMPs as it relates to installation, maintenance, removal, replacement, and/or new BMP implementation as required in response to changing site conditions, or when a BMP is determined ineffective as required in Section 9-06-04 ESC Plan Field Changes.

9-05-05-04 REPORTING

Once the construction site has met final stabilization measures, in accordance with Section 9-07-04 Final Construction Site Stabilization and ESC Plan Submittal, the Permittee shall notify the Transportation Department - SRC Unit to schedule a Closeout Stormwater Quality Inspection as required in Section 9-05-09 Permit Closeout Notification.

The County reserves the right to request a copy of the ESC Plan, inspection reports and associated documents at any time. A specific time frame will be identified in which the Permittee must submit the requested documentation. If the Permittee fails to provide the requested documentation, a violation will be assessed in accordance with Section 9-07-05 Stormwater Quality Regulation Violations.

9-05-06 STORMWATER QUALITY PERMIT FEES

Stormwater Quality Permit Fees shall be established by resolution by the Board of County Commissioners. The permit and review fees shall be paid at the time of submittal of any SWQ Permits.

9-05-07 FINANCIAL SURETY

Financial surety consisting of an irrevocable letter-of-credit shall be submitted in an amount sufficient to purchase, install and maintain the temporary and permanent erosion and sediment control BMP measures. These measures are represented on both the ESC Plan and Landscape Plan through the Community and Economic Development Department. Refer to Appendix A for Irrevocable Letter of Credit – Site Improvements application and Irrevocable Letter-of-Credit – Subdivision Improvement application. Surety shall remain in place for a period of one (1) year after ground disturbing construction activities are completed to allow time for re-vegetation to reach final stabilization as required in Section 9-07-04 Final Construction Site Stabilization. If final stabilization is not met within one year upon issuance of a SWQ Permit, then the surety shall be extended until final stabilization is accomplished.

The amount of financial surety for an Adams County Stormwater Quality Permit is based on the industry average cost provided on the BMP Cost worksheet, which includes the BMP as well as installation and maintenance of all the erosion and sediment controls required on a construction site. At a minimum, the financial surety shall not be less that 20% of the site improvements. A copy of the Cost Opinion Worksheet (Worksheet) in supplemental stormwater guide shall be used for preparing the opinion of probable costs for erosion and sediment controls.

The Worksheet shall be filled out completely and submitted as part of the submittal for the SWQ Permit. The probable cost Worksheet will be reviewed for reasonable quantities and costs by Adams County Transportation Department.

9-05-07-01 EXPIRATION OF FINANCIAL SURETY

If the construction of the project or re-vegetation process takes longer than one year, the Permittee shall extend the posted financial surety no less than ninety (90) calendar days prior to the expiration date. Failure to extend the financial surety, for a minimum of one (1) additional year, prior to the ninety (90) day deadline shall result in the County drawing upon the financial surety.

9-05-08 EXEMPTIONS

Exemption from the Adams County Stormwater Quality Permit will be considered for any of the following construction activities in addition to the activities listed in Adams County Ordinance No. 11 Concerning Illicit Discharges to the Waters of the State within Unincorporated Adams County. These construction activities include:

- Agricultural practices including tilling, planting, harvesting, or livestock operations, grazing and animal husbandry
- Pavement maintenance on public and private roadways such as an overlay or pavement patching (temporary BMP installations and applicable County permit(s) will still be required)
- Emergency situations that pose an imminent risk to life or property, such as hazardous waste cleanup operations and emergency fire fighting

- Geotechnical boring investigations and utility potholing
- Emergency utility repairs
- Mowing operations
- Weed control
- Controlled burning
- New fencing installation and maintenance of existing fence
- Erosion abatement projects (unless over 1 ac of disturbance)
- Pavement repair and replacement on public trails

9-05-08-01 MS4 PERMITTEES WITHIN UNICORPORATED ADAMS COUNTY

All standard and non-standard MS4 permittee's located within unincorporated Adams County are required to obtain an Adams County Stormwater Quality Permit with the condition that proof of state certification for the CDPS Stormwater Construction Permit shall be provided once a contractor is selected.

9-05-09 PERMIT CLOSEOUT

In order to close out an Adams County Stormwater Quality permit, all of the following measures must be met:

a. Notify the Stormwater Regulatory Compliance Unit as required in Section 9-05-09 Permit Closeout Notification.

b. When a construction Site is final stabilized, but prior to BMP removal; submit an electronic color copy of the ESC Plan final marked up copy to Adams County Transportation Department – SRC Unit with all revisions and markups that update the plan during construction for stabilization.

c. Provide Construction Site Stabilization Certification and color photo documentation in compliance with Section 9-07-04 Construction Site Stabilization Certification.

d. BMPs will be removed after the final Closeout Inspection and prior Release of Financial Surety Request has been approved by the SRC Unit.

e. Provide a copy of the State CDPS Stormwater Construction Permit Inactivation Application.

9-05-10 PERMIT CLOSEOUT NOTIFICATION

Permittee must contact Adams County Transportation Department - SRC Unit to set up a Closeout Stormwater Quality Inspection. This notification shall be sent to the Transportation Department - SRC Unit via e-mail as indicated on the County SWQ Permit. The Transportation Department – SRC Unit must be contacted by the Permittee at least seven (7) business days prior to scheduling the final inspection.

The purpose of the Closeout Inspection is to verify the site is adequately stabilized and/or covered with pavement or structures, per the County accepted plans.

If the Adams County Transportation Department - SRC Unit needs to conduct more than one Closeout Inspection, an inspection fee will be assessed for each additional closeout inspection, as approved by resolution, by the Board of County Commissioners.

9-05-10-01 REMOVAL OF TEMPORARY BMPS

Once the site has met the final stabilization conditions, as specified in Section 9-07-04 Final Construction Site Stabilization, the remaining temporary BMPs such as perimeter controls, inlet protection, silt fence, etc. shall be removed and disposed of properly.

9-05-10-02 CONSTRUCTION SITE STABILIZATION CERTIFICATION

The responsible Adams County Stormwater Quality Permit holder (permittee) shall provide formal notarized certification in accordance with the stabilization certification page found in the supplemental stormwater guide.

The signed, sealed and notarized Stabilization Certification shall be submitted, in electronic form, to Adams County Transportation Department - SRC Unit along with documented proof in the form of electronic color photographs, depicting the stabilized site. The photographs must show the materials used for stabilization and that growth of the vegetation is adequate. It must be proved that the vegetation is 70% of pre-disturbance levels and no sediment will erode outside the permitted area. Refer to the supplemental stormwater guide for a copy of the Stabilization Certification Form.

Remove all temporary BMPs in compliance with Section 9-05-09-01 Removal of Temporary BMPs.

9-05-11 RELEASE OF FINANCIAL SURETY

Once all conditions as specified in Section 9-05 Stormwater Quality Permit, have been met, the permittee may submit a Release of Surety for the Stormwater Quality Permit Request Application found in Appendix A. This form shall be submitted to Adams County Transportation Department SRC Unit.

After Transportation Department – SRC Unit has received a completed request form, and adequate documentation, the County Stormwater Quality Program Administrator, or designee, will sign off on the release of financial assurance and the financial assurance will be released.

9-06 EROSION AND SEDIMENT CONTROL PLAN

Adams County requires an Erosion and Sediment Control Plan (ESC Plan) as part of the SWQ Permit that specifically authorizes a project to discharge into the County's MS4.

This Section presents criteria of the ESC Plan. All BMPs shall be designed, implemented and maintained to mitigate soil erosion and subsequent deposition of sediment and pollutants off-site during the period of construction from start of earth disturbance until final stabilization and permanent stormwater quality BMPs are effectively in place.

An ESC Plan must be submitted to the County, for applicable construction sites within unincorporated Adams County, as part of the development review process. The ESC Plan is reviewed by the County for compliance with County Stormwater Quality Regulations.

Review of the ESC Plan for adequacy shall be conducted by the Permittee during construction. Adams County reviews the ESC Plan for completeness with the Adams County Stormwater Quality Regulations only. It shall be understood that additional or revised BMPs will be required, should construction site observation indicate that the ESC Plan is not adequately controlling erosion, capturing sediment, or stormwater runoff from potential pollutant sources.

9-06-01 PLAN PURPOSE

An Erosion and Sediment Control Plan (ESC Plan) is a required item under the Adams County Stormwater Quality Regulations. An ESC Plan identifies and describes appropriate BMPs that will be implemented at the construction site. An ESC Plan shall be prepared in accordance with good engineering and hydrologic pollution control practices.

The main purpose of the ESC Plan is to improve water quality by reducing pollutants in stormwater discharges from construction sites. The ESC Plan describes and ensures implementation, maintenance and inspection of BMPs which, when implemented, will meet the terms and conditions of the County Stormwater Quality Regulations.

An ESC Plan is a detailed plan that shall include:

- BMPs that address erosion control practices, sediment control practices and waste management. These can be temporary or permanent, structural or non-structural BMPs that will be used to prevent erosion, capture sediment, mitigate construction site waste and reduce stormwater pollution.
- Locations of the selected BMPs,
- BMP details, which shall include information regarding BMP descriptions, appropriate uses, design and installation, maintenance and removal information.

9-06-02 PLAN CRITERIA

When preparing an ESC Plan for Adams County, use the Erosion and Sediment Control Template and BMP details included in the supplemental stormwater guide. All ESC Plans shall include all the items outlined in the template.

9-06-02-01 STRUCTURAL AND NON-STRUCTURAL EROSION CONTROL BMPS

The Permittee must control erosion during construction. To control erosion is to control the disturbed ground from moving; to keep the disturbed ground in place. There are five (5) effective keys to erosion control:

1. Minimize disturbed area and protect natural features and soil.
2. Phase construction activity and seeding.
3. Control stormwater flowing onto and through the project.
4. Stabilize soils promptly.
5. Protect slopes.

Refer to the supplemental stormwater guide for details of acceptable erosion control BMPs.

9-06-02-02 STRUCTURAL AND NON-STRUCTURAL SEDIMENT CONTROL BMPS

The Permittee must control the transportation of sediment during construction. To control the transportation of sediment is to control eroded sediment from leaving the disturbed area, i.e. the second line of defense. There are six (6) effective keys to sediment control:

1. Protect storm drain inlets.
2. Establish perimeter controls.
3. Retain sediment on-site and control dewatering practices.
4. Establish stabilized construction entrances/exits.
5. Install, inspect and maintain BMPs.
6. Remove BMP’s, when appropriate.

Refer to the supplemental stormwater guide for details of acceptable sediment control BMPs.

9-06-03 SELECTION OF BEST MANAGEMENT PRACTICES

During construction, it is a requirement that temporary structural and non-structural BMPs be installed and maintained in proper working order. The Permittee must ensure that all BMPs are appropriate for the selected application, installed per detail, maintained according to the detail and in an effective working condition.

When selecting a BMP it is imperative that the designer select it for the intended function. It is also important to understand how BMPs function, proper maintenance of the BMP and removal of the BMP.

All temporary structural and non-structural erosion and sediment control BMP measures shall be installed, properly maintained, and removed in conformance with the details presented in the supplemental stormwater guide.

The following BMPs shall not be used in ESC Plan design or field implementation within the County's permitted MS4 vicinity.

- Crushed or recycled concrete used for any vehicle tracking pad/control
- Milled or recycled asphalt used for any vehicle tracking pad/control

9-06-03-01 WASTE MANAGEMENT

Construction activities can introduce a variety of non-sediment pollutants to stormwater runoff. Waste materials, such as discarded building materials and solid waste from construction activities, shall be disposed of properly in a timely manner and removed from the construction site.

Waste materials shall not be buried, dumped or left at the permitted construction site. Waste materials shall not be temporarily placed or stored in the street, alley, or other public right-of-way with the exception of construction located within the public right-of-way.

All materials stored on-site shall be stored in a neat and orderly manner, in their original containers, with original manufacturer's labels. Materials shall not be stored in a location where they may be carried by stormwater runoff into the County's MS4 or State Waters.

The following construction site wastes shall be identified and eliminated from discharging outside the permitted area, into groundwater or into the County's MS4. Include the following details in the ESC Plan using the guidance provided in the supplemental stormwater guide:

1. Covering Outdoor Storage and Handling Areas
2. Spill Prevention, Containment and Control
3. Good Housekeeping

4. Vehicle Maintenance, Fueling and Storage
5. Use of Pesticides, Herbicides and Fertilizers
6. Street Sweeping and Cleaning
7. Storm Sewer System Cleaning

The Permittee shall use supplemental stormwater guide as a reference to create each individual waste plan. Below is a list of individual waste plans that are required as part of the ESC Plan:

1. Solid Waste (e.g. sediment, gravel, compost, building materials, vehicle tracking, construction spoils, trash)
2. Liquid Waste (e.g. oil, gas, tar, hydraulic fluid)
3. Concrete and Paint Washout (e.g. truck chute, associated fixtures and equipment)
4. Sanitary Waste (e.g. worker trash, portable toilets, waste piles and dumpsters, etc.)
5. Chemical Waste (e.g. fertilizers, pesticides, detergents, fuels, solvents, oils, etc.)
6. Contaminated Groundwater Management, if applicable
7. Permitted Construction Dewatering, if applicable

9-06-04 ESC PLAN FIELD CHANGES

It is a requirement of the SWQ Permit that the ESC Plan is kept on the construction site and is updated at all times as construction progresses. It is expected that all ESC Plans will be revised in the field.

The Permittee is responsible for amending the ESC Plan. ESC Plan changes addressing BMP implementation are often required to be made in response to changing site conditions, or when an existing BMP is determined ineffective. ESC Plan revisions to address these changes can be made immediately with quick in-the-field revisions to the ESC Plan.

1. The ESC Plan shall be revised as soon as practiable, but in no case more than 72 hours after change(s) in BMP installation or implementation.
2. A notation shall be include in the ESC Plan prior to the site change(s) that include the time, date and initials of the change(s) in the field and BMP(s) location(s) depicted on the plans.

If the ESC Plan is not up to date, or the Permittee fails to conduct a mandated inspection, it shall be deemed inadequate resulting in County

Stormwater Quality Violations as identified in Section 9-07-05 Stormwater Quality Regulation Violations.

9-06-04-01 DRAINAGEWAY PROTECTION

Drainageway control measures protect channels and/or storm sewers during site construction. Acceptable control measures include limiting equipment travel across the waterway; construct a temporary channel crossing or temporary diversion structure as detailed in the supplemental stormwater guide.

9-07 STORMWATER QUALITY SITE INSPECTIONS

All construction activities that are required to obtain an Adams County SWQ Permit and submit an ESC Plan must be inspected by the County Stormwater Regulatory Compliance Unit to ensure compliance with the County's Stormwater Quality Regulations.

Adams County reserves the right to request submittals of documents associated with the Stormwater Quality Regulations, this includes but is not limited to inspection documentation, the modified ESC Plan. The County will identify a time frame that specifies the date in which the Permittee must submit the requested documentation. If the Permittee fails to provide the requested documentation, a violation will be assessed in accordance with Section 9-07-05 Stormwater Quality Regulation Violations.

County inspections shall not be used in place of the inspections that are required under the SRC Permit.

9-07-01 COUNTY STORMWATER QUALITY INSPECTIONS

The focus of the County's stormwater quality inspections is to verify that BMPs are implemented, installed and maintained in accordance with the ESC Plan. Adams County stormwater quality inspections also determine compliance with the County's Regulations. These inspections do not substitute for the Permittee's requirements under the State CDPS Stormwater Construction Permit.

9-07-02 RIGHT OF ENTRY

By signature of the SWQ Permit, the permittee must allow Adams County Stormwater Regulatory Compliance Unit staff the right-of-entry for the following:

1. To enter upon the project premises where a regulated facility or activity is located or in which records are required to be kept under the terms and conditions of the Adams County SWQ Permit.

2. To have access to the project premises to request copies of any records, inspection reports, plans or documentation required to be kept under the terms and conditions of the Adams County Stormwater Quality Regulations.

3. To enter upon the project premises to investigate, within reason, any actual, suspected, or potential source of water pollution, or any violation of the Adams County Ordinance No. 11 or Colorado Water Quality Control Act. The investigation may include, but is not limited to, the following: sampling of any discharge or process waters, the taking of photographs, interviewing associated personnel on alleged violations, and access to any and all facilities or areas within the project premises that may have any effect on the discharge, permit, or alleged violations.

9-07-03 TYPES OF STORMWATER QUALITY SITE INSPECTIONS

The County performs the following are types of inspections at construction sites located within unincorporated Adams County's MS4 Permitted area during the construction process.

The SRC Unit is responsible for determining if a Follow-up or Indicator Inspection is needed or if submission of additional information to verify that necessary actions taken to be in compliance are adequate.

9-07-03-01 COMPLIANCE INSPECTIONS

Compliance Inspections are conducted by the SRC Unit. The purpose of these inspections is to confirm that the ESC Plan has been implemented, the ESC Plan is updated, inspections by the permittee are being performed, BMPs are implemented according to the accepted ESC Plan, as amended, that BMPs are functioning as intended, and properly maintained.

9-07-03-01-01 *FOLLOW-UP INSPECTIONS*

Follow-up Inspections are conducted by the SRC Unit and are considered to be a reduced level inspection. Follow-up inspections are conducted by the SRC Unit to ensure that measures or requirements from a Compliance Inspection have been complied with or performed. These requirements may involve the cleanup of a discharge, implementing additional or revised BMPs, repairing, reinstalling, or maintaining damaged or non-functioning BMPs, etc.

9-07-03-02 INDICATOR INSPECTIONS

Indicator Inspections can be conducted by a Transportation Department inspector. The purpose of an indicator inspection is to assess construction sites for signs of non-compliance. These inspections do not fully assess the adequacy of BMPs or the overall site environmental management.

9-07-03-03 STABILIZATION INSPECTIONS

Stabilization Inspections are conducted by the SRC Unit. Stabilization Inspections occur when construction is complete and the site is in the process of achieving final stabilization conditions.

The purpose of a stabilization inspection is to monitor the vegetative process and BMPs to ensure maintenance by the Permittee.

9-07-03-04 CLOSEOUT INSPECTIONS

Closeout Inspections are conducted by the SRC Unit. Prior to closing out an Adams County SWQ Permit and removing BMPs, the permittee shall contact the SRC Unit to schedule a Closeout Inspection. The Permittee shall contact the SRC Unit at least 3 business days prior to scheduling a Closeout Inspection.

The purpose of a Closeout Inspection is to determine if measures have been taken to stabilize the site prior to closing the SWQ Permit, and prior to release of any financial surety.

9-07-04 FINAL CONSTRUCTION SITE STABILIZATION

Final Construction Site Stabilization means that all ground disturbing activities are complete, and all disturbed areas have either been built on, paved over or are awaiting uniform vegetative cover per County accepted plans.

Prior to closing out the Adams County Stormwater Quality Permit, all the items listed below must be completed in order for the construction site to be considered to have final stabilization.

1. The site has a uniform vegetative cover with a density of at least seventy percent (70%) compared to the original undisturbed site. Such cover is capable of adequately controlling soil erosion, as determined by the Stormwater Regulatory Compliance Unit.

2. Proper installation of all approved, permanent, post-construction stormwater quality BMPs.

3. Removal of all stockpiles of soil, construction material/debris, construction equipment, etc. from the construction site.

4. Streets, parking lots and other surrounding paved surfaces are clean and free of any sediment or debris.

5. Removal of sediment and debris within private drainage facilities, caused by the construction activity; this includes all pollutants. The Permittee shall restore any damaged public infrastructure caused by the Permittee's construction activities.

6. Provide documentation as required by Section 9-05-08 Permit Closeout and Section 9-05-09 Permit Closeout Notification.

9-07-05 STORMWATER QUALITY REGULATION VIOLATIONS

Any person who undertakes or causes to be undertaken any activity, which involves disturbance of the surface of land shall ensure that soil erosion, sedimentation, increased pollutant loads and changes water flow characteristics resulting from the activity are controlled so as to minimize pollution of receiving waters.

9-07-05-01 POLICIES

The following policies apply to enforcement at construction sites within the unincorporated areas of Adams County.

1. It is the policy of Adams County to encourage compliance with the Stormwater Quality Regulations by working with the Permittee during construction.

2. It is the responsibility of the Permittee to provide color photo documentation of the condition of the existing storm sewer system and to identify any sediment or debris in the system prior to the commencement of construction. If the Permittee cannot demonstrate that there was existing sediment or debris in the storm sewer system prior to construction, the Permittee shall clean the storm sewer system affected by the project using acceptable methods.

3. The County will allow the Permittee a reasonable amount of time to take the necessary measures to bring a construction site into compliance with its on-site ESC Plan prior to formal enforcement.

4. The County considers the owner of the land the ultimate responsible party for all construction activities. It is the responsibility of the owner to take all

necessary measures to ensure that the site is in compliance with County, State and Federal statues, regulations, ordinances and permits.

5. The County has, to the maximum extent practicable, made its Stormwater Quality Regulations consistent with State requirements for construction activities as mandated by the CDPS Stormwater MS4 Permit COR-090000. In the event of conflicting requirements, the most stringent or restrictive shall govern.

9-07-05-02 VIOLATIONS

Adams County complies with Colorado Revised Statute, Title 30 Government – County to enforce the Stormwater Quality Regulations specifically, 30-15-401.11, CRS et. seq. These regulations allow the County to enforce upon a Permittee or violator of these regulations to compel the abatement of any condition that caused or contributes to a violation of the Adams County Stormwater Quality Regulations.

The following items are considered a violation of the Adams County Regulations or Adams County Ordinance No. 11 Concerning Illicit Discharges to the Waters of the State within Unincorporated Adams County.

A. Conducting Permit Covered Activity without a County SWQ Permit.

B. Failure to prepare an Erosion and Sediment Control Plan.

C. Deficient Erosion and Sediment Control Plan.

D. Failure to install, maintain or properly select Best Management Practices.

E. Failure to perform required inspections of the permitted construction site.

F. Failure to submit requested documentation.

G. Failure to adequately respond to the SRC Unit's findings as designated by a Compliance Inspection Notification.

H. Failure to conduct a mandated inspection or to update the Erosion and Sediment Control Plan adequately to reflect site conditions.

I. Pollution, contamination or degradation of stormwater quality caused by work outside of the Adams County Stormwater Quality Permit boundary.

J. An illicit discharge into the County's Municipal Separate Storm Sewer System.

Table 9-14 Enforcement – Sheet A

SWQ Violation	Findings Summary	Enforcement Level	Result
Violation 9-07-05-02 A. Conducting Permit Covered Activity without a County SWQ Permit	Permittee has failed to obtain a County Stormwater Quality Permit prior to construction activities commence.	Level 1 - Notification	Warning – Certified Compliance Advisory specifying time frame to submit a complete permit and documentation Work will be suspended until permit has been issued
		Level 2 – Violation	Stormwater Quality Violation – Notification of Violation Work will be suspended until permit has been issued
		Level 3 – Chronic and Recalcitrant Violation/s	Civil Action –Notification of Compliance Order Work will be suspended until permit has been issued
Violation 9-07-05-02 B. Failure to prepare an Erosion and Sediment Control Plan	Permittee has failed to prepare an Erosion and Sediment Control Plan in which erosion and sediment control and waste management measures have been designated and detailed.	Level 1 - Notification	Warning – Certified Compliance Advisory specifying time frame to submit a complete permit Work will be suspended until permit has been issued
		Level 2 – Violation	Stormwater Quality Violation – Notification of Violation. Work will be suspended until permit has been issued
		Level 3 – Chronic and Recalcitrant Violation/s	Civil Action – Notification of Compliance Order. Work will be suspended until permit has been issued
Violation 9-07-05-02 C. Deficient Erosion and Sediment Control Plan	Permittee's ESC Plan does not have erosion and sediment controls or waste management measures to adequately mitigate waste, prevent erosion or capture sediment.	Level 1 - Notification	Warning – Compliance Inspection Notification Findings
		Level 2 – Violation	Stormwater Quality Violation – Notification of Violation
		Level 3 – Chronic and Recalcitrant Violation/s	Civil Action – Notification of Compliance Order
Violation 9-07-05-02 D. Failure to install, maintain or properly select Best Management Practices	Permittee's BMPs are not installed per accepted detail, not maintained as specified on the accepted detail, or has misused a BMP as specified on the accepted detail.	Level 1 - Notification	Warning – Compliance Inspection Notification Findings
		Level 2 – Violation	Stormwater Quality Violation – Notification of Violation
		Level 3 – Chronic and Recalcitrant Violation/s	Civil Action – Notification of Compliance Order
Violation 9-07-05-02 E. Failure to perform required inspections of the permitted construction site.	Permittee has failed to perform inspections in accordance with the County Standards and Regulations.	Level 1 - Notification	Warning – Compliance Inspection Notification Findings
		Level 2 – Violation	Stormwater Quality Violation – Notification of Violation
		Level 3 – Chronic and Recalcitrant Violation/s	Civil Action – Notification of Compliance Order

*SRC Unit will not sign off on a Certificate of Occupancy if a construction site is in violation of the County Stormwater Quality Regulations. Enforcement is compliant with CRS 30-15-401.11

Table 9-14 Enforcement – Sheet B

SWQ Violation	Findings Summary	Enforcement Level	Result
Violation 9-07-05-02 F. Failure to submit required/requested reports or documents	Permittee has failed to provide the requested documentation to the County by the designated date.	Level 1 - Notification	Warning – Compliance Inspection Notification Findings
		Level 2 – Violation	Stormwater Quality Violation – Notification of Violation
		Level 3 – Chronic and Recalcitrant Violation/s	Civil Action – Notification of Compliance Order
Violation 9-07-05-02 G. Failure to adequately respond to the SRC Unit's findings as designated by the Compliance Inspection Notification	Permittee has failed to mitigate findings as documented by the Compliance Inspection Notification.	Level 1 - Notification	Warning – Compliance Inspection Notification Findings
		Level 2 – Violation	Stormwater Quality Violation – Notification of Violation
		Level 3 – Chronic and Recalcitrant Violation/s	Civil Action – Notification of Compliance Order
Violation 9-07-05-02 H. Failure to maintain the Erosion and Sediment Control Plan to reflect current site conditions	Permittee has failed to update the Erosion and Sediment Control Plan to reflect site conditions within 72 hours after change(s) in BMP installation or implementation occur at the site with adequate notations.	Level 1 - Notification	Warning – Compliance Inspection Notification Findings
		Level 2 – Violation	Stormwater Quality Violation – Notification of Violation
		Level 3 – Chronic and Recalcitrant Violation/s	Civil Action – Notification of Compliance Order
Violation 9-07-05-02 I. Pollution, contamination or degradation of stormwater quality caused by working outside of the County SWQ Permit boundary	Permittee has failed to contain all construction activities or pollutants within the SWQ Permit boundary.	Level 1 - Notification	Warning – Compliance Inspection Notification Findings
		Level 2 – Violation	Stormwater Quality Violation – Notification of Violation
		Level 3 – Chronic and Recalcitrant Violation/s	Civil Action – Notification of Compliance Order
Violation 9-07-05-02 J. An illicit discharge into the County's Municipal Separate Storm Sewer System	Permittee has allowed pollutants to enter into the County's Municipal Separate Storm Sewer System.	Level 1 - Notification	Stormwater Quality Violation – Notification of Violation
		Level 2 – Violation	Civil Action – Notification of Compliance Order
		Level 3 – Chronic and Recalcitrant Violation/s	SWQ Permit Revocation

*SRC Unit will not sign off on a building permit if a construction site is in violation of the County Stormwater Quality Regulations. Enforcement is compliant with CRS 30-15-401.11.

9-08 POST – CONSTRUCTION RUNOFF REGULATIONS

A form of permanent structural post-construction BMP to improve stormwater quality is required for development or redevelopment that disturbs 1 acre or greater or part of a larger development or sale that is located within the County's MS4 Permitted area. This section contains guidance for the selection and placement of permanent structural BMPs for new development and redevelopment in addition to insure the post-construction maintenance of the BMPs.

9-08-01 APPLICABILITY

All sites located within unincorporated Adams County that include a total development/redevelopment area of disturbance consisting of one acre or larger for which stormwater quantity detention is required, must provide permanent structural BMPs. Water Quality Capture Volume (WQCV) must be incorporated into the stormwater quantity detention as discussed later in this section. Other permanent BMPs may also be required as appropriate.

9-08-02 ACCEPTABLE METHODS

The County allows the following types of stormwater quality permanent Best Management Practices (BMPs), as amended.

- Grass Buffer
    - Grass Swale
    - Extended Detention Basin
    - Retention Pond – refer to section 9-01-12 if no discharge
    - Outlet Structures

See the supplemental stormwater guide for design criteria of these permanent BMPs. Other stormwater quality post-construction BMPs will be considered on a case by case basis.

9-08-03 PROPRIETARY AND ALTERNATIVE BMPS

The technology of BMPs is constantly changing. New innovations are being developed and existing technologies are being refined to be more effective. The BMPs included in these standards and regulations are not meant to be comprehensive. Should the owner or engineer desire to use BMPs other that those recommended in these standards and regulations, it will be necessary to

provide documentation that adequately demonstrates an alternative BMP option can effectively control stormwater runoff quality. Proprietary and alternative BMP options will be reviewed on a case-by-case basis. Demonstration of proprietary and alternative BMPs

9-08-04 OPERATIONS AND MAINTENANCE OF PERMANENT BMPS

An important part of water quality facilities management is the continued maintenance of post-construction BMP facilities to ensure they function as designed.

For example, maintenance may include lawn mowing and care, debris and litter removal, erosion mitigation, structural repairs, mosquito control, and sediment removal. Such tasks as these mentioned are necessary to preclude the facility from becoming unhealthy and to retain the effectiveness of the permanent BMP.

The property owner is responsible for the maintenance of all privately owned drainage facilities including inlets, pipes, culverts, channels, ditches, hydraulic structures, emergency spillways, detention basins, retention basins, etc. located on private land unless modified by the subdivision development agreement.

9-08-04-01 MAINTENANCE REQUIREMENT

The County requires maintenance of private storm drainage facilities, to include post-construction BMPs. This maintenance requirement shall be clearly stated within plat notes or in a separate warranty deed for the property in question. Refer to Appendices D Maintenance Easement for the language that must be included in applicable plats or warranty deeds.

9-08-04-02 MAINTENANCE ACCESS

Adams County requires that maintenance access be provided to storm drainage facilities to assure continuous operational capability of the system. Should the property owner fail to adequately maintain said facilities, the County shall have the right to enter said land for the purposes of repair or maintenance. Such repair or maintenance costs shall be assessed to the property owner.

9-08-05 POST-CONSTRUCTION VIOLATIONS

Adams County complies with Colorado Revised Statute, Title 30 Government – County to enforce the Stormwater Quality Regulations specifically, 30-15-401.11, CRS et. seq. These Regulations allow the County to enforce measures

to compel the abatement of any condition that caused or contributes to a violation of the Adams County Stormwater Quality Regulations.

The following items are considered a violation of the Adams County Regulations or the Adams County Ordinance No. 11.

A. Failure to maintain Post-Construction BMPs to reflect approved site conditions. Maintenance includes:
    1) Lawn mowing and care
    2) Debris and/or litter removal
    3) Erosion mitigation
    4) Structural repairs to drainage facilities
    5) Mosquito control
    6) Sediment removal

9-09 APPEALS

9-09-01 PURPOSE

The purpose of this Section is to detail the steps and requirements for appeals from a Notice of Violation by the Transportation Department to ensure these standards, regulations and Ordinance No. 11 are administered properly and consistently with the policies adopted by the County.

9-09-02 APPLICABILITY

This appeals process is applicable to County Ordinance No. 11 (hereafter referred to as Ordinance) to include and ensure proper maintenance of post-construction BMPs and the Illicit Discharge Detection and Elimination Minimum Control Measure to meet the requirements of the County's CDPS Stormwater MS4 Permit.

All appeals from a Notice of Violation by the Transportation Department must be processed in accordance with this Section. The Board of County Commissioners shall have the authority to hear and decide appeals by any aggrieved person where it is alleged there is an error in the Transportation Department determination.

9-09-03 TIME LIMITATIONS

The notice of appeal must be received within ten (10) calendar days from the date of the Notice of Violation that was issued or rendered by the Transportation Department. The Director of the Transportation Department may waive or extend this deadline only upon finding the person filing the appeal received insufficient

or constructive form of notice of the violation being appealed. Failure to file the appeal in a timely manner shall constitute a waiver of any rights to appeal under this Ordinance.

A public hearing on the appeal before the Board of County Commissioners shall take place within forty-five (45) days from the date of receipt of a complete notice of appeal. The decision of the Board of County Commissioners shall be final.

9-09-04 APPEAL REVIEW PROCEDURES

An appeal is initiated by submitting a completed appeal application form to the Director of the Transportation Department. An appeal shall be processed through a public hearing before the Board of County Commissioners (See Steps 1 through 9 below). The Board of County Commissioners shall grant the appeal, modify the The Transportation Department determination, or deny the appeal based on consideration of the staff report, the evidence from the public hearing, and compliance with this Ordinance.

9-09-05 APPEAL REVIEW STEPS

The processing of an appeal shall be according to, in compliance with, and subject to the provisions contained in Steps No. 1 through 9 (Attachment B-17) of the Notice of Violation review procedures as follows:

1. Conceptual Review:

   Applicable.

2. Appeal Application Submittal:

Applicable. All items or documents required for an appeal including ten (10) copies of the following information shall be submitted to the Director of the Transportation Department at least thirty (30) days prior to the first open Board of County Commissioners public hearing agenda.

- Review Fee of one-hundred dollars ($100) made payable to Adams County
- Applicant Information
  a. Name
  b. Address, City, State and Zip Code
  c. Phone Number
  d. Second Phone Number (Fax, cell, etc. please specify)
  e. E-mail
- Description of Site

a. Address, City, State and Zip Code

b. Area Disturbed (acres)

c. Tax Assessor Parcel Number

d. Existing Zoning

e. Existing Land Use

- Justification

  a. Written explanation of the appeal and a general overview of the issues. The explanation shall include written statements regarding each of the items appealed.

- Certification Statement

  a. "I hereby certify that I am making this appeal as the owner of the above described property, or acting under the authority of the owner (attach authorization, if not the owner). I am familiar with all pertinent requirements, procedures, regulations, and fees of the County. I understand that the review fee is non-refundable. All statements made in this appeal are true to the best of my knowledge and belief."

  b. Owner Printed Name and Date

  c. Owner Signature

  d. Notarized.

3. Determination of Violation Severity:

   Applicable. The Director of the Transportation Department shall certify in writing to the Board of County Commissioners that a stay poses an imminent peril to life or property or would seriously interfere with the enforcement of this ordinance. The Board of County Commissioners shall review the certification and may override the stay of further proceedings.

4. Staff Report:

   Applicable. Copies of all written materials required for the appeals process to decide the appeal that are transmitted to, or in the possession of, the Director of the Transportation Department shall be incorporated into the staff report given to the Board of County Commissioners, in which the appeal from the Transportation Department administrative decision shall be judged upon given the documented reasons.

5. Public Notice:

   Applicable. Public notice of the Public Hearing will be sent to adjacent property owners a minimum of ten (10) days prior to the Public Hearing.

6. Standards:

Applicable.

7. Conditions of Approval:

   Applicable.

8. Amendments:

   Applicable.

9-09-06 CRITERIA FOR APPROVAL

The Board of County Commissioners, in granting an appeal or modifying the Director of the Transportation Department's determination, shall have all the powers of the Director of the Transportation Department. In making its decision to grant an appeal or modify a determination, the Board shall find error in the application of this Regulation and/or Ordinance on the part of the Director of the Transportation Department. The decision concerning the appeal shall set forth the basis of the Board of County Commissioners decision.

9-09-07 ACTION BY THE DIRECTOR OF THE TRANSPORTATION DEPARTMENT AND FOLLOWING THE GRANT OF AN APPEAL

Upon the granting of an appeal or modification of the Director of the Transportation Department's determination by the Board of County Commissioners, the Director of the Transportation Department shall send a letter of decision to the applicant. The letter of decision shall describe in detail the grant of appeal approved by the Board of County Commissioners.

9-09-08 EFFECT OF APPROVAL

The Applicant shall be subject to all permits required by federal, state and local regulations. All orders, decisions, determinations, and interpretations made under those permit procedures shall be consistent with the reversal or modification granted to the appellant.

REFERENCES

Colorado Department of Public Health and Environment. CDPS General Permit – Stormwater Discharges Associated with Municipal Separate Storm Sewer Systems, as amended.

Colorado Department of Public Health and Environment. CDPS General Permit – Stormwater Discharges Associated with Construction Activity, as amended.

Colorado Department of Public Health and Environment. Colorado's Phase II Municipal Guidance. October 2001.

Colorado Department of Public Health and Environment. Table 4 Enforcement Response Guide

Urban Drainage and Flood Control District. Urban Storm Drainage Criteria Manual, Volume 3 – Best Management Practices. June 2002 revised, November 2010, as amended.